THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LIV. No. 1386.] LONDON, DECEMBER 3, 1889. [41ST YEAR. Price 6d.

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Improved Continuous Distillation. Produces either Sulphate or Liquor Ammoniæ.
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This Apparatus has been successfully at work for years in over 100 Establishments in England, Germany, France, and America.
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IMPROVED DRY GAS-METERS;

STATION METERS OF ALL SIZES, with PLANED JOINTS;

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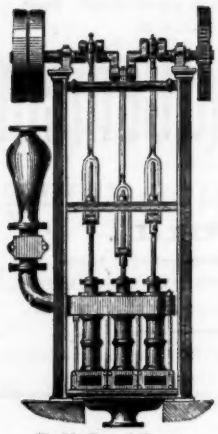
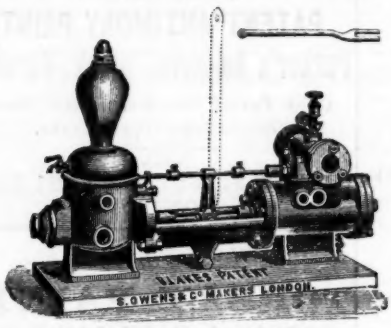
FOR PUMPING TAR, WATER, AND LIQUOR.



Treble-Barrel Pumps in Frame.

Syphon Pump.

Double-Barrel Force-Pump in Frame.



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Improved Double Action Pump.

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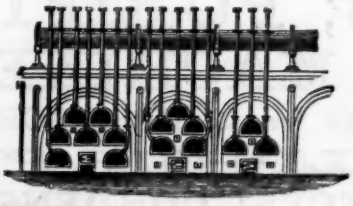

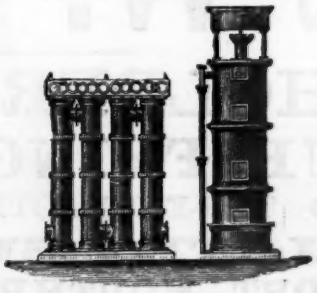

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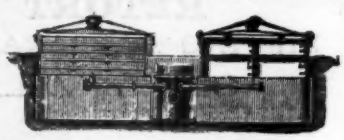

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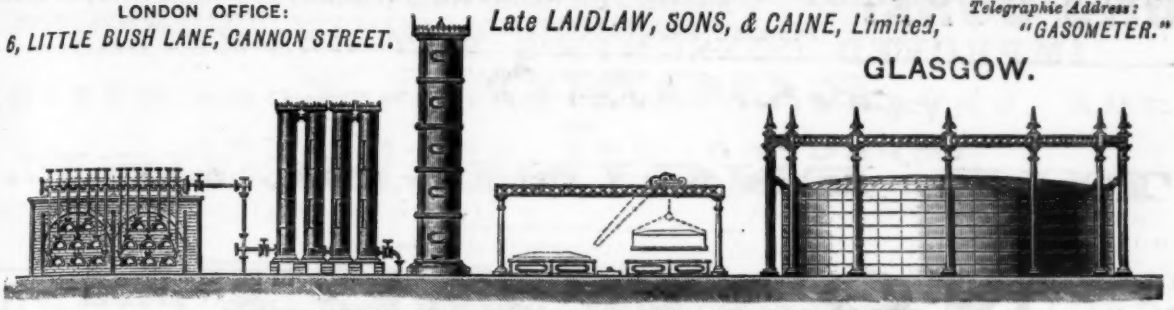

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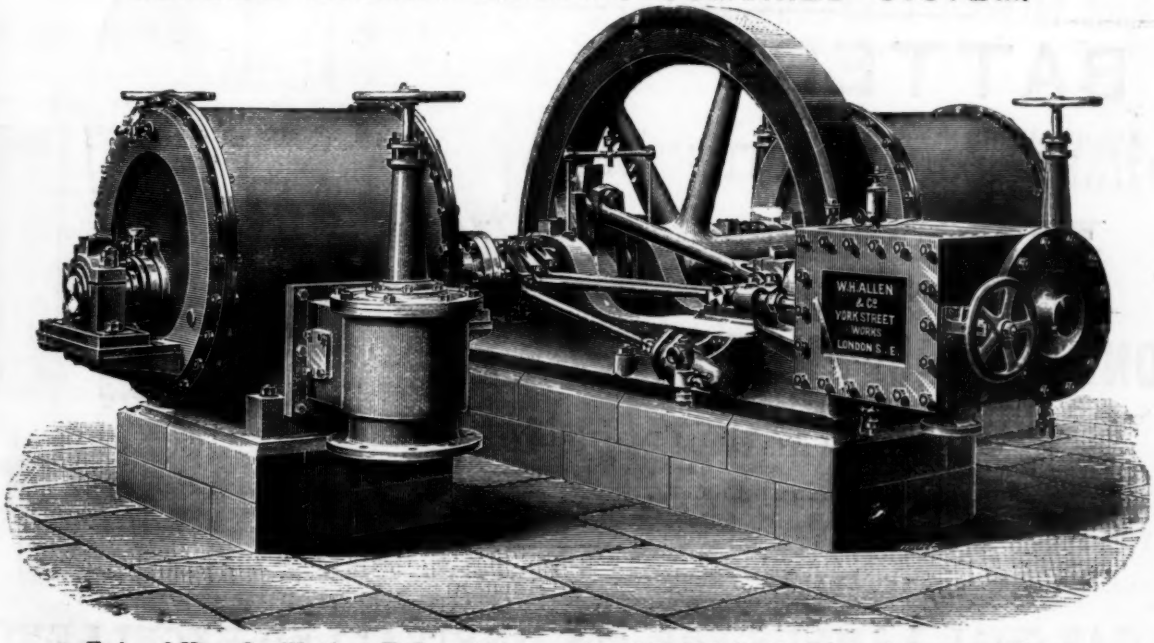

Pair of Non-Oscillating Exhausters, passing 200,000 Cubic Feet of Gas per Hour.

GAS COAL.

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NO WASTE
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Pays for itself in a very short time.

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BATTERY
OF
THREE DOUBLE-ACTION
Pumps
DRIVEN FROM
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The Pumps are provided with suitable Valves for pumping Ammoniacal Liquor, Tar, and Water; and each is provided with Disengaging Gear, in order that any one can be stopped or started while the Engine is in motion.

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For Streets, Railway Platforms, &c., &c.

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This Lamp and Top, being made entirely of Glass, is perfectly impervious to corrosion, and therefore invaluable in Manufacturing and other Towns. The Top can be had in Opal, clear or coloured Glass; and is much cheaper than the old style of metal frames.

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CASTINGS OF EVERY DESCRIPTION.

MANUFACTURED BY THE

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The most successful and approved Apparatus known up to the present time.

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And to the following Gas Companies and Corporations:—

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HALIFAX.	MARKET HARBRO'.	CHESTER.
ALTRINCHAM.	PRESCOT.	SOUTH SHIELDS.
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HUDDERSFIELD.	ORMSKIRK.	LUTON.
		HAMPTON COURT.

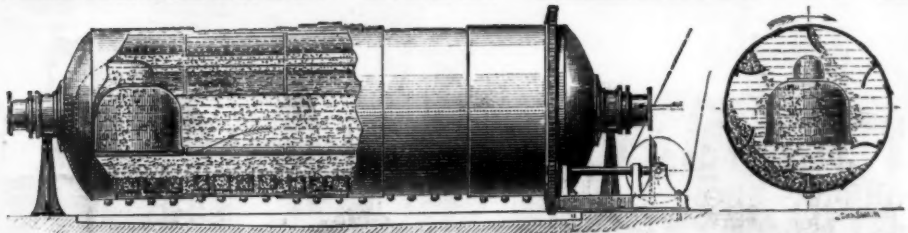
THE

REVOLVING PURIFIER

(ANDERSON'S PATENT)

For the Purification of River Water and Sewage Effluent in Large Volumes, and for Removing Colour from Water containing Peat or Clay,

BY AGITATION WITH METALLIC IRON.



MADE IN FOURTEEN SIZES; CAPABLE OF TREATING SINGLY 5000 TO 1¼ MILLION GALLONS PER DAY. REDUCES ORGANIC MATTER FROM 45 TO 90 PER CENT.; TOTALLY REMOVES MICROBES FROM POLLUTED WATER.

☞ GOLD MEDAL, INVENTIONS EXHIBITION, 1885. ☜

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CLAYTON SON & Co LIMITED, LEEDS.

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OF ALL FORMS & SHAPES IN IRON OR STEEL BY SPECIAL HYDRAULIC MACHINERY.

PRICES ON APPLICATION.

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MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,

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TABLE GLASS OF ALL KINDS,

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MODERATOR LAMPS.

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WASHER-SCRUBBER AND SLOW-SPEED CONDENSER

(KELMAN & HENDERSON'S PATENTS)

These Apparatus are in use at the Gas-Works at Lincoln, Mountain Ash, Neath, Ellesmere (Salop), and Woodstock (Capetown); and

Two large CONDENSERS capable of dealing with **4,000,000** cubic feet of Gas per day are in course of Manufacture for the Gas-Works at Sheffield.

For Prices and further Information apply to

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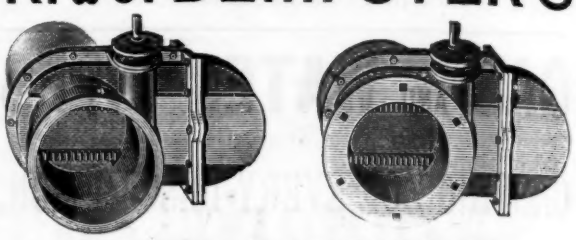

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The pinions of all our Slide Valves are now cut by special machinery from solid forgings. Valves of 10-in. bore and upwards are fitted with double racks, without extra charge. The flanges are all faced and made to standard dimensions, unless otherwise ordered. All valves are tested and guaranteed tight before leaving the works.

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No. 1. Flange Valve.

NO SLIP.

NO OSCILLATION.

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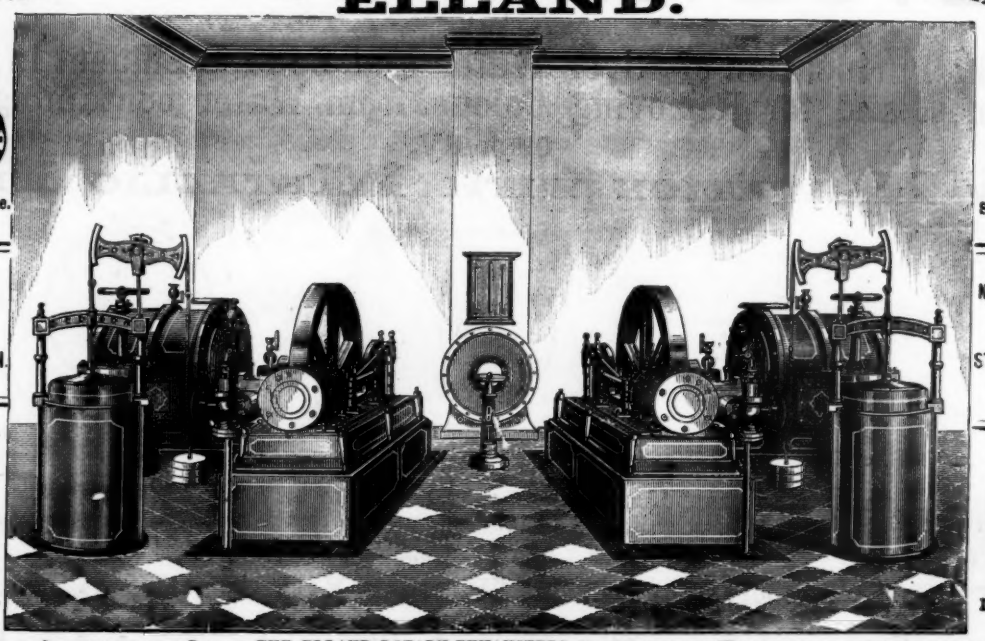

No. 5. Screw Valve.

NO HIGH SPEED.

STEADY GAUGE.

No. 6. Disc Valve.

THE ABOVE IS AN ILLUSTRATION OF A PAIR OF THE ELLAND ROTARY EXHAUSTERS ERECTED BY US AT WIGAN, EACH OF WHICH ARE CAPABLE OF PASSING 80,000 CUBIC FEET OF GAS PER HOUR.

Makers of every other description of Gas Plant, including Retorts, Retort Mountings, Condensers, Washers, Tar and Liquor Separators, Scrubbers, Purifiers, Gasholders any size, Patent Centre-Valves, Four-Way Valves, Rack, Screw, and other Valves.

Testimonials and References on Application to

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KIRKHAM, HULETT, & CHANDLER, Ld.,

PALACE CHAMBERS,

9, BRIDGE ST., WESTMINSTER.

Mr. S. HERSEY, Managing-Director.

THE "NEW" PATENT

"Standard" Washer-Scrubber,

As supplied to The Gaslight and Coke Company, &c., &c., &c.

The Gaslight and Coke Company,
Horseferry Road, S.W.,
Nov. 25, 1889.

Messrs. KIRKHAM, HULETT, AND CHANDLER, LTD.,

GENTLEMEN,—In reply to your enquiry respecting the result of putting Wooden "Bundles" into some of the Washer-Scrubbers at our Beckton Station, I beg to say that they have answered admirably for the few months they have been in; and I think them a decided success.

I am, yours truly,
(Signed) G. C. TREWBY.

The Improvements comprised in the "New" Patent "Standard" Washer-Scrubber have been applied to the original "Standard" Washer-Scrubbers at Beckton. *(See the above.)*

The Apparatus can be applied to "Standard" Washer-Scrubbers already in use.

Particulars will be furnished upon application to the above address.

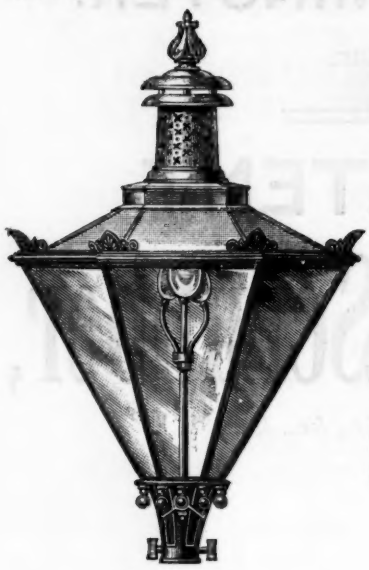
D. HULETT & CO., LIMITED,

GAS ENGINEERS,

55 and 56, High Holborn, London,

MANUFACTURERS OF EVERY DESCRIPTION OF GAS-FITTINGS,

GAS-METERS, GAS-LAMPS, GOVERNORS, ETC.



HIGH-POWER LAMPS

OF THE MOST IMPROVED CONSTRUCTION.

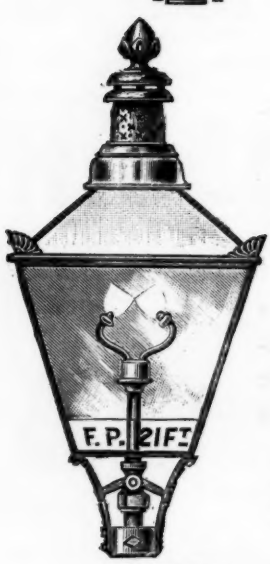
STRONG COPPER TOPS.

PATENT GOVERNOR BURNERS,

Giving from 16 to 450 Candle Power.

D. HULETT & Co., Limited,

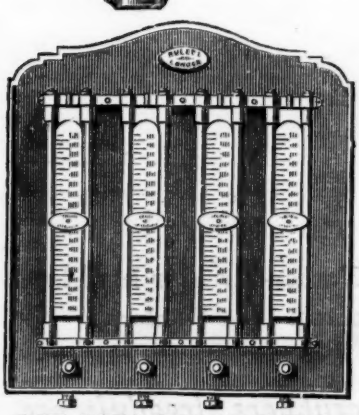
Invite Gas Companies and Local Authorities to compare the Quality of these Lamps with other Makers'.



PATENT STREET LAMPS.

NO PUTTY REQUIRED.

Several thousands of these have been made, and are giving every satisfaction. New Glass can be inserted in a few minutes by any inexperienced person.

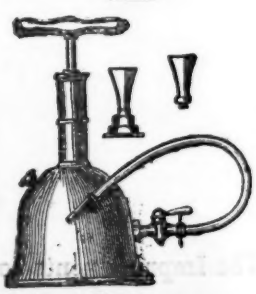


HULETT'S

Patent Service Cleanser,

FOR REMOVING OBSTRUCTIONS IN SERVICE-PIPES AND MAINS.

No Gas Company should be without this Valuable Invention.

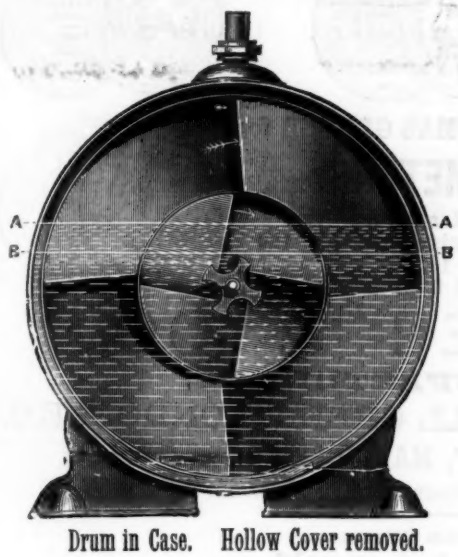


PATENT STREET LAMP GOVERNORS.

STATION PRESSURE GAUGES, on Enamelled Iron Plates.

WROUGHT AND CAST IRON TUBES AND FITTINGS.

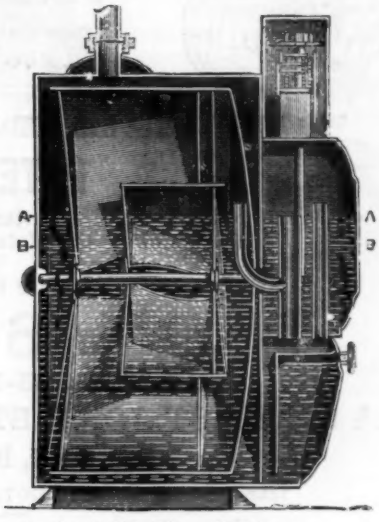
THE WARNER AND COWAN METER.



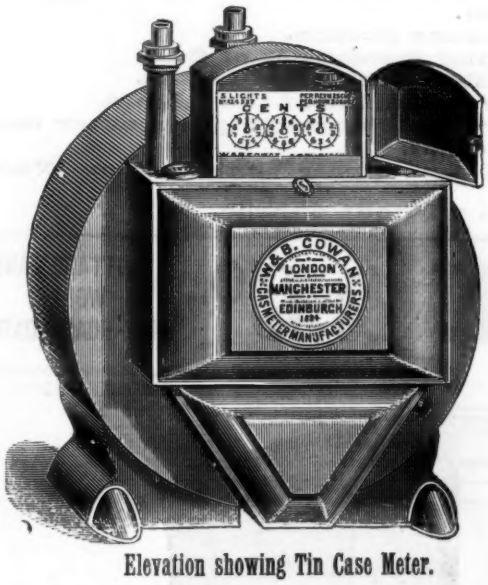
A A, High-Water Line.

B B, Low-Water Line.

Drum in Case. Hollow Cover removed.



Sectional Side View of Meter.



Elevation showing Tin Case Meter.

Elevation showing Cast-Iron Case Meter.

In its completeness as a measure, the WARNER AND COWAN drum differs from every other. Of definite capacity, irrespective of the water-line, it can neither be over nor under filled, but discharges at each revolution the same volume of gas.

It is to this also that its secondary, though important, advantage is due—viz., the long float-range which this drum permits.

The illustrations show front and side views of the drum, and also views of the complete meter—both in tin and cast-iron case.

The drum being of fixed capacity within itself, the extraneous mechanism and arrangements are of the most simple character. These include all that is necessary, but exclude all that would be superfluous.

W. & B. COWAN,

ESTABLISHED 1827

SMITH SQUARE WORKS, WESTMINSTER, LONDON, S.W.

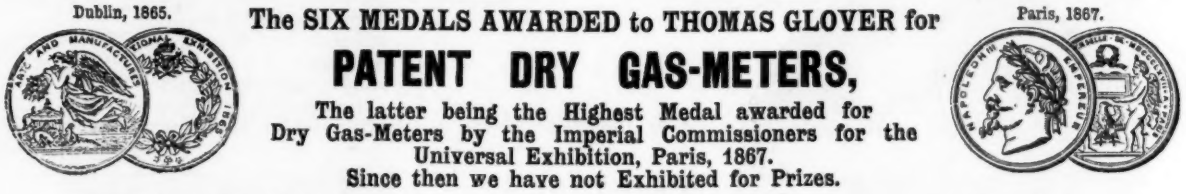
DUTTON STREET WORKS, MANCHESTER.

BUCCLEUCH STREET WORKS, EDINBURGH.

ESTABLISHED 1844.] **ORIGINAL MAKERS.** [ESTABLISHED 1844.

London, 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865. Paris, 1867.



The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.
Since then we have not Exhibited for Prizes.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 to 222, ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.;

And at 37, BLACKFRIARS STREET, MANCHESTER.

TELEGRAPHIC ADDRESSES: "GOTHIC LONDON," "GOTHIC MANCHESTER." TELEPHONE No. 6725.

1st—Are a remedy for all the defects of Wet Meters.
2nd—Are suitable for all climates, whether hot or cold.
3rd—Incur no loss of Gas by Evaporation.
4th—Cannot become fixed by Frost, however severe.
5th—Are the most accurate and unvarying measurers of Gas.
6th—Prevent jumping or unexpected extinction of the Lights.
7th—May be fixed either above or below the level of the Lights.
8th—Cannot be tampered with without visibly damaging the outer case.
9th—Will last much longer than Wet Meters.
10th—Will not cost more than one-half for repair that Wet or Water Meters do.
Are upheld for five years without charge.

W. PARKINSON & Co.,

COTTAGE LANE WORKS.
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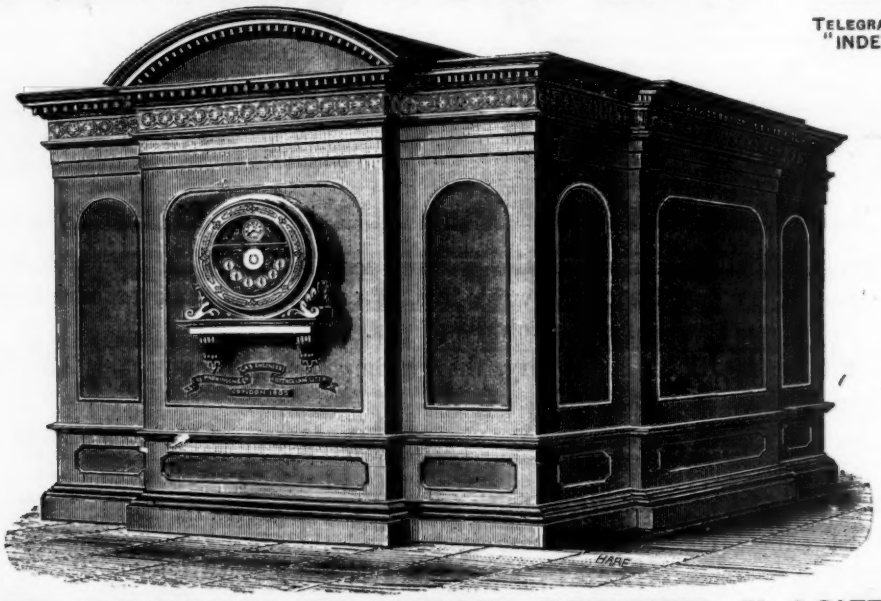

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[See also Advt., p. 1088.

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THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, DECEMBER 3, 1889.

THE DANGERS OF WATER GAS, COAL GAS, AND ELECTRICITY.

THE incident of the death of two men on the works of the Leeds Forge Company, under circumstances suggestive of poisoning by water gas, has naturally attracted a good deal of public attention during the past week; and it may be expected that more will be heard of it when the Coroner's inquest is completed. We shall then, in all probability, have numerous comments on the affair from the omniscient newspaper writers; and it will be something to be thankful for if these lucubrations do not darken counsel. If it should be found, according to law, that the unfortunate Leeds Forge boiler-makers were killed by water gas, the lesson will not be thrown away upon manufacturers and others whose ideas on this subject may have been influenced by Mr. Samson Fox's attempt to put a new face upon the water gas question. Mr. Fox has talked a good deal of decided nonsense about the comparative safety of water gas and coal gas; and but for the essential wrongfulness of attaching special meanings to particular events, it might be said that this trouble is the penalty he has to pay for his excessive confidence in water gas. It is, at any rate, a striking coincidence that this disaster should have happened upon the works with which Mr. Fox is identified. If it had occurred elsewhere, even in connection with an application of the water gas system which Mr. Fox claims for his own property, it would have been open for him to have got rid of the responsibility that now weighs upon him, and may be gravely augmented by the verdict of the Coroner's jury. It is, however, at the headquarters of the movement controlled by the British Water Gas Syndicate that this casualty has occurred; and there is no possible way for Mr. Fox out of the embarrassing situation, unless one is found for him by the Coroner's jury.

In another column will be found a discussion of the question of the poisonous nature of water gas, which, before Mr. Samson Fox undertook to persuade people to the contrary, was one of the commonplaces of gas engineering knowledge. Our readers are never likely to forget that water gas is poisonous in proportion to its richness in carbonic oxide. They know also that carbonic oxide is not merely dangerous to inhale in the same way as are coal gas and carbonic acid. These suffocate their victims, which is bad enough; but carbonic oxide is very much worse, inasmuch as it acts directly upon the blood. The difference is that, whereas men overcome by breathing coal gas or carbonic acid can be revived by removal into fresh air, this is not so in case of inhalations of carbonic oxide. Knowledge of this truth is likely to differently affect different people. Some will be too timid to entertain the idea of dealing in such a deadly commodity as water gas certainly is, when improperly used through accident or design. Others will hold that just as we cannot have railways without railway accidents, or use steam power without occasional explosions, it is more reasonable to inquire, before condemning water gas or any other resource of civilization on account of its danger to life, what is the average expectation of disaster when the thing is used for the proper purposes with ordinary care. If an opinion can be formed upon this point, it then remains to be determined whether the benefits derivable from the employment of this particular device or material are such as to outweigh the average risk attending its use. Every industrial process involving risk to the person or to property is judged in the same way; and if the decision is against the process, legislation is invoked to reduce the chances of disaster, or, if needful, to prohibit the whole thing. It is only necessary to cite the petroleum trade and the manufacture of explosives, as illustrating this argument.

Water gas would probably be classified among the things and processes in modern civilization which are not highly dangerous, like petroleum spirit and dynamite, but yet require care in the using, and bring responsibility upon the providers, like electricity and coal gas. It is not for dealers in coal gas to throw stones at anybody who endeavours to push a commodity which is dangerous unless properly used. We have roadway explosions, explosions in rooms, and suffocations in gas-heated baths, to teach us forbearance in this respect. As for electricians, the amount of experience with strong electrical currents in this country is not yet sufficient to teach us what are the limits of permissible risk in their distribution; but it is only too likely that there will be a terrible awakening before long. Too many people have been killed in America in the interest of cheap electric lighting; but this is nothing compared with what may happen when the Deptford station is set to work and the Ferranti mains charged with the high potential intended. The London Correspondent of the *Scotsman* reports that when Mr. Edison saw what was being done at Deptford, he "thought of the "eighth of an inch of hard rubber between that current and "human life, and told them that when they had it complete "they had better move their families into a powder maga-"zine." All sorts of similar smart sayings are attributed to Mr. Edison; but if this story is not true it is very much to the point. An article by Mr. Edison, on "The "Dangers of Electric Lighting," appeared in last month's number of the *North American Review*, in which the haziness that has been thrown round the subject by the utterances of interested experts is thoroughly cleared away. Of course, it may be said that Mr. Edison is himself an interested expert; being committed to his own system of low-tension currents. It cannot be denied, however, that he probably

knows as much about other systems of electrical distribution as those who advocate them; and as he is able to cite positive facts in support of his expressions of opinion, he will convince many who might otherwise have given credence to Mr. W. H. Preece and other apologists of the alternating system. It is popularly assumed that all electric lighting wires will be rendered harmless if buried underground. Mr. Edison, however, dispels this pleasing delusion, and shows that the supposed remedy will increase the danger. He says: "There is no known insulation that will confine these high-"tension currents for more than a limited period." This is a disturbing prospect for the Deptford experimentalists.

It is open for an advocate of water gas to say that nobody of similar authority has condemned water gas as uncompromisingly as Mr. Edison condemns high-pressure and alternating electrical currents; yet the production of the latter is not forbidden by law. What may be the case when these currents have killed a few score of people in Great Britain, we cannot say. The newspapers will shriek for protection for the public when a certain period of experience and endurance has been exceeded, and will indignantly ask why Government did not give heed to the words of warning that they now ignore. The great thing to bear in mind is that for electricity, coal gas, or water gas makers and users there is a Nemesis that attends the transgression of right principles of preparation, distribution, and utilization. The best course to follow, when the nature and probable extent of a danger are detected, is neither to minimize nor exaggerate it, and especially not to try to hoodwink uninstructed people on the subject. These are simple and obvious counsels; but they are only too frequently forgotten, or, if remembered, disobeyed. There is a degree of danger attending the use of very many of the conveniences of modern civilization, which must be reckoned with by those who would take advantage of them. Sane men and women cannot be always calculating their chances of incurring the penalties of their position, since there is scarcely an action of human life, from the cradle to the grave, which does not every day prove fatal to somebody. The only course we can follow under these conditions is the one that reason marks out—avoid obvious hazards, while taking our chance of the dangers that environ existence. This is not fatalism, but simple necessity.

AN INDICTMENT OF THE GAS WORKERS' UNION.

It is with much regret that we find ourselves compelled, after patiently watching the proceedings of the Gas Workers' Union for many weeks, to express the deliberately-formed conclusion that it is going wrong. When this organization was founded, and for some time after, we forbore all comment which might by any chance be read as condemning the efforts of gas workmen to improve their condition by combining. The question whether the men did or did not belong to a Trades Union had nothing to do with their engagement; and we have all along held that they might join a Trade Society as freely as they might enter a sick club or insure their lives. From the beginning, however, there has been very noticeable a tendency on the part of some of the leaders in this Society movement to enforce their orders by mob law, and to increase their nominal strength by terrorism. Still, we could find some excuses for much roughness and loud talk on the part of unpolished stokers, so long as it could be considered that they meant well, according to their lights. When brought face to face with their employers, the men showed as keen a sense of the necessities of their situation as any Member of Parliament who finds it expedient to keep one strain of oratory for the House of Commons and another for his unlettered constituents. Consistency in all places and under all conditions is not a virtue that the demagogues of the present day particularly affect; and it would be absurd to expect of gas stokers exploiting a grievance a moderation of speech which Cabinet Ministers "on the stump" do not invariably display. Forbearance has its limits, however, and when the turbid talk of the self-appointed leaders of the Gas Workers' Union culminates, as it has done at last, in overt acts of tyranny and bad faith, it is time to make a stand for the right. We reported last week how in a London gas-works the Union officials were become as touchy as a French bureaucrat, and as ready to complain of being "insulted" when a workman intimated an intention for the future of doing without their control. Matters have gone farther than that in Manchester, however, for at the present moment the great majority of the retort-house hands in the employ of the Manchester Corporation have given in their notices, with a view to compel the Committee to discharge all non-Union men. It is the same at Salford, where preparations for a "shortage" of gas are already taken in hand by the authorities. The Committees, and the Corporations behind them—to their honour be it recorded—have met this demand with an uncompromising refusal; declaring that they would rather stop gas making than consent to be the instruments of this abominable tyranny. We believe they will be as good as their word. The Mayor, Aldermen, and Town Councillors of Manchester and Salford will be found other mettle to deal with in a matter of this kind than the Bristol weaklings. It is with no desire to wreak vengeance upon the misguided Manchester stokers that we express the hope that when they are turned out of their present employment no gas manager in the kingdom will take them on. Let the Union support them all the winter. It will do more to bring the leaders to their senses than anything else that might happen.

Nothing could be worse than the counsels which professing friends have, up to the present time, given the Gas Workers' Union. The Manchester case is, in some respects, like the London one. In both, the men obtained all they asked for in the matter of pay and working hours; the employers exhibiting no reluctance in agreeing to terms which meant heavy additional expenditure. Formal agreements were signed by both parties; and the settlement was regarded as completely satisfactory on both sides. Since then, however, the men have scarcely been quiet for one week. Claim after claim has been preferred, without the slightest regard on one side for the terms of the agreement which had been scrupulously observed on the other. The men do not pretend that the employers have failed in carrying out every jot and tittle of the settlement, whereby they might be held warranted in reopening it. In all this the Unionists are upheld by the *Labour Elector* and other pretended admirers, who ask insolently whether the men, having obtained all that they once asked for, are to "rest and be thankful," and never again seek to "improve their position." Mr. Livesey and the South Metropolitan Directors in particular—probably because they are solicitous of doing their best by the men—are threatened that if they resist the Union, the great and good Mr. John Burns will "propose" to buy the undertakings for the County Council, of course to be administered strictly upon Trades' Union principles. It never occurs to these curiously-minded people that possibly Mr. John Burns is not everybody; but if they are deluding themselves into the belief that an elected local authority would sacrifice everything to the clamour of a few workmen, regardless of the justice of the cry, let them consider the present action of the Manchester and Salford Corporations. The police, and any required force of special constables, if necessary, will teach the rebellious Manchester stokers to understand what fair play means, and "coerce" them into practising it. The lesson that Mr. Thorne and all his henchmen in town and country require to be taught is that it is as iniquitous for them to procure the dismissal of a man from his employment because he is not a member of the Union, as it would be for an employer to expel another man because he joins the Society. That is the principle to which the spirit of trades' unionism is almost invariably inimical. We do most sincerely hope that no gas committee or board of directors, when confronted with a similar emergency to that which has to be met in Manchester, would hesitate as to the course to be pursued. Better far, as Mr. S. Chesters-Thompson worthily said, at the meeting of the Manchester Corporation last week, that not a foot of gas should be made than that injustice should be done and common-sense outraged by submission to Trades' Union tyranny. Resistance would never have to be carried to such lengths as this, however; for these monstrous pretensions would collapse before the stern consequences of obstinacy. The men have been so accustomed of late to ask and have in matters of money and time, that they are easily befooled into thinking they will never be withstood. Employers perceive by this time, however, that it is not the game of the Union officials to let the men feel contented; and it is recognized that the line must certainly be drawn somewhere. Let it be drawn at tyranny, and the good sense of the English people will applaud the determination.

THE MANCHESTER DISTRICT MEETING—THE DINSMORE PROCESS.

The members of the Manchester District Institution of Gas Engineers met on Saturday under the presidency, for the last time, of Mr. T. Banbury Ball, of Rochdale. The President for the ensuing year is Mr. W. W. Hutchinson, of Barnsley.

The attendance at the meeting was not particularly large, although the proceedings were distinctly interesting; comprising as they did the first publication, upon anything like authority, of the working and results of the Dinsmore process. Whether Saturday's communication is intended for a reply to Mr. W. A. Valon's hitherto unanswered question respecting the balance-sheet of a Dinsmore retort-setting, is not for us to say. Mr. Valon's name is nowhere mentioned; but as no notice had been previously taken of his inquiry, it is probable he will treat Mr. Isaac Carr's paper and Mr. W. Foster's report as the first response, albeit a roundabout one, to his query. It remains to be seen whether the reply, now it has come, will be regarded as quite full and satisfactory. It appears that a number of Gas Managers in the North Midland and Lancashire districts are preparing to give the Dinsmore process a trial; and Mr. Foster plainly advises their doing so. The paper and report were not fully criticized at the meeting; the discussion being adjourned. It is to be hoped that those who are interested in this matter will take an early opportunity of examining the statements of Mr. Carr and Mr. Foster, and will freely express their views on the subject. Either there is something in the Dinsmore process or there is not; and if anybody desires to pick a hole in Mr. Carr's description or Mr. Foster's figures, now is the time to do it. A paper by Mr. Thomas Newbigging, on the "Use of Water "in Gas Manufacture," was also received at this meeting, but was not read owing to want of time.

THE SALFORD SCANDAL AGAIN.

The new development of the Salford affair is seriously dividing public opinion in the Manchester district. The irrepressible councillor, Mr. J. G. Mandley has hastened to put himself at the head of that section of the ratepayers who profess distrust of the Committee of the Town Council charged with the duty of investigating the business, and is taking steps to obtain a Royal Commission to inquire into the whole question. It is asserted locally that the action against Mr. Ellis Lever has been commenced on his own initiative by the Town Clerk, who has assumed the functions of the Investigation Committee, and that its object is to make Mr. Lever pay his alleged proportion of the sum of £10,000 which the Corporation agreed to take from different contractors, through Hunter, to compromise their claims against these parties. It does not appear that Mr. Lever was included in the list of contractors against whom the Corporation instituted, or threatened to institute, proceedings for the recovery of money supposed to have been paid to Hunter in the form of illicit commissions. It is explained that an arrangement was concluded between Hunter and the Corporation, according to which the former was to pay £10,000 to hush up the whole affair; whereupon all legal action was to cease, and a petition for the mitigation of Hunter's imprisonment was to be supported by the leading members of the Corporation. The petition was "blown "upon," however, and its rejection rendered inevitable; and then, naturally enough, the money was not forthcoming. Negotiations have been going on incessantly between the Town Clerk's office and the ex-Gas Manager in prison, which resulted, as is now reported, in the communication of evidence to justify the commencement of an action against Mr. Lever for something like £2000. It is asserted, and believed by many people, that if this amount can be extracted from Mr. Lever, it is to be deducted from the sum which Hunter has covenanted to pay to the Corporation; and they therefore ask who is the next person or firm to be "squeezed" for Hunter's benefit? All this testifies to the existence in the district of a deeply-seated feeling of distrust, which finds definite expression in the demand for a Royal Commission. It is a most unsavoury tale, and can hardly be read without creating a sense of nausea. What will be the end of it all, nobody can say. It is more than probable that, uncomfortable as these flying hints and suspicions make the business firms that enjoyed the profits of the Salford connection during the Hunter *régime*, they will be still more seriously troubled before the disturbance is all over. Some of these people have doubtless wished many times that the offence for which Hunter is now undergoing imprisonment had been a capital one, and that the criminal had suffered accordingly.

Owing to the pressure on our space to-day, we are compelled to defer till next week the publication of our usual notices of the applications proposed to be made in the next session of Parliament for Acts and Provisional Orders relating to the supply of gas, water, and electricity.

Essays, Commentaries, and Reviews.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 1075.)

The general tone of the Stock Markets during the past week has been favourable; but they have presented no special feature. The Gas Market has been very irregular; for while the large issues—Gaslight "A" and Imperial Continental—have improved, some important stocks (like South Metropolitan) have remained unchanged, and others (like Commercial and Brentford) are lower. The market is thus very unsettled, and what is most apparent is the inability to distinguish the respective values of the various undertakings dealt in. Some of the best are among the cheapest in the market. Taking the case of the Metropolitan Companies, it is believed that their recent fall in price is in a considerable degree owing to the fear that they will have to raise their price for gas as the Leeds Corporation have raised theirs. If this be so, it shows that the wholly dissimilar conditions upon which municipal gas undertakings and gas companies are worked is not understood. Space here will not permit full demonstration of this; but we will briefly point out that municipal undertakings are not managed on those fixed principles regarding price and profit which bind the private enterprise. Behind the former is the great power of local rates; and it matters comparatively little whether the gas is sold at a very high price and yields very large returns which are carried to the relief of the rates, as at Manchester, or whether it is sold at a very low price and at a loss which the rates must make good, as at Leeds. We cannot here, though we might, stop to denounce the injustice of overcharging the Manchester gas consumers to benefit the ratepayers. Well, we believe that the Leeds gas undertaking has for years past been worked at a loss, the deficit for 1888 being £6626, and the aggregate deficit now reaching £30,000. The rates cannot stand this state of things any longer; and the undertaking has to be made more self-supporting. Now, what is the case of the London Gas Companies? Not only have they been self-supporting for years past, but they have accumulated large reserves for the express purpose of maintaining their dividends in any years in which they failed to earn them in full. From the first institution of the sliding scale it was foreseen that they must be prepared for fluctuations of prosperity like every other commercial enterprise; and that if they loyally exerted themselves to reduce from time to time the price of their gas to the lowest possible figure, they should be protected from any injury which might result from this in the event of anything like an occasional hard time. In this way the mutual interests of the consumers and the company were wisely interwoven. The result of this is that by prudent management (for, since the first introduction of the sliding scale, 14 years ago, it is by the self-denying devotion to the reserve funds of a portion of the profits which might have been appropriated to dividends that those funds have been built up) the three London Companies have now in hard cash upwards of £1,350,000 of invested funds and unappropriated profits. Of this sum, The Gaslight and Coke Company have something under a million sterling, or nearly 10 per cent. of their entire share and loan capital; the South Metropolitan, nearly £300,000, or 11½ per cent. of their similar capital; and the Commercial, nearly £150,000, or no less than 18 per cent. of their similar capital. Anybody can verify these figures for himself by referring to the Companies' published accounts certified by the Government Auditor; and when he has done so, let him form his own conclusions as to what chance there is of the Companies raising their price.

Very briefly to note the daily operations: Gas was quite unchanged on Monday; and on Tuesday there was a little more activity, coupled with a tendency to improvement in Gaslight "A," though quotations did not alter. On Wednesday, business was very restricted, and movements were irregular. Gaslight "A" and Imperial Continental improved 1 each. But Brentford and Commercial old fell 2 each; and Commercial new, 3. On Thursday, Gaslight "A" was quite a bone of contention, and was repeatedly done at fluctuating figures. Top price was marked more than once; and the quotations closed 1 higher. Imperial Continental also rose 1; but Gaslight debentures, Brentfords, Brighton, British, Bombay, and San Paulo were all lower. Friday was quieter; Imperial Continental "buyers" were 1 better. Commercials were done "specially" at low figures, and the new fell 2. Saturday offered nothing to remark, except a further rise of 1 in Gaslight "A." Chelsea Water fell 1.

ELECTRIC LIGHTING MEMORANDA.

MR. EDISON ON THE DANGERS OF ELECTRIC LIGHTING—ELECTRIC LIGHTING COMPETITION IN VIENNA—THE AMALGAMATED BRUSH COMPANY'S MEETING—ELECTRIC LIGHT ENGINEERING IN ENGLAND AND AMERICA.

Students of electric lighting systems may be recommended to read with all due attention the very outspoken article on "The Dangers of Electric Lighting" which Mr. T. A. Edison has contributed to the *North American Review*. We cannot reproduce, or even give an abstract of this interesting communication, which has been called for, without doubt, by the recent tragedies arising from the employment of overhead wires for distributing high-potential currents in New York, and bears upon the outcry for placing all such wires underground. Mr. Edison has scarcely any need for proving his argument that high-potential and alternating currents are dangerous; for the people of New York have had only too much by way of ocular demonstration of the fact. He lays it

down, however, for guidance that low-tension continuous currents of not exceeding 200 volts, such as he uses in his own system, are innocuous. High-tension continuous or semi-continuous currents, with a pressure of 2000 volts and upwards, are, he says, deadly. The passage of the alternating current, of any power actually employed in main wires for lighting, means instantaneous death. Putting the wires underground would be an aggravation of the danger; for, as Mr. Edison very pointedly says, "if a nitro-glycerine factory was being operated in the city of New York, and people desired to remove the danger, no one would suggest putting it underground." He declares that the best methods of insulating a wire conveying a high-tension current may be efficient enough for a time, but are certain to break down eventually. Public safety can only be assured, Mr. Edison thinks, by forbidding altogether the generation and distribution of dangerously strong direct currents, and of alternating currents. He states that these are only adopted in order to save capital outlay in land and copper. They enable stations to be erected at a distance from the area to be lit, which generally means the substitution of a cheap site for an expensive one. Also they save weight in mains; but that is all. It is argued that it is not right to subject the community to the risk of these deadly currents merely to suit the convenience of speculators who want to do their work "on the cheap." The whole article is a tremendous indictment of some of the most popular systems of electrical distribution. It is very remarkable that the electrical journals do not discuss this declaration of Mr. Edison's views; perhaps because they have so persistently belauded the enterprise of the Metropolitan Electric Supply Company and Mr. Ferranti that they cannot admit, even as matter for argument, the presumption that the Deptford experiment is fundamentally faulty.

The Vienna electric lighting experiment of the Imperial Continental Gas Association is threatened with the competition of a concern called the International Electric Company, which is being established upon a site granted for the purpose by the Danube Commission. How much this venture represents of simple business speculation, and how much of enmity to the Association, does not appear in the reports that have come to hand, which describe the new works as likely to develop into something very extensive. The Zipernowsky system is being followed; and the works are stated to be large enough to accommodate engines of 12,000-horse power, although in the first place only 2400-horse power is being erected. There is perhaps room in Vienna for several electric lighting companies. But the Association have aimed at securing the "cream" of the trade; and if this is taken from them, or they have to compete for it at low rates, the result will not be so satisfactory as they fondly imagined would be the case when they first went into the business.

The first statutory meeting of the Brush Electrical Engineering Company has been held—Lord Thurlow in the chair. This is the amalgamated concern of which the old Brush, the Australasian, and Falcon Companies are the units. The Chairman was able to assure the assembled proprietors that everything was going on in the most prosperous fashion imaginable; allowing it to be understood that the only circumstance troubling him and his co-Directors was the painful necessity under which they lay of turning away orders! This boast recalls the story of the imaginative auctioneer, who summed up his recommendations of a "property" he had to sell by confessing that it possessed two grave drawbacks—the rose leaves made an unsightly litter on the grass, and the nightingales were quite a nuisance all the summer. Well will it be for the Brush shareholders, and happy will be their Chairman, if the tale which he told on the occasion now under notice represents the whole of the troubles of the concern. A little time, however, must be allowed for the proving of these matters.

Mr. G. Addenbrooke has read a paper before a meeting of the members of the Institution of Electrical Engineers, upon the recent progress of electrical engineering in America, which is a subject that always attracts attention. The author summed up the later development of the electric lighting enterprise in America by saying that it had been more concerned with the commercial and industrial improvement of already existing inventions than with the introduction of new types of apparatus or new ideas. What had struck him most in a journey from ocean to ocean was the prevalence of arc lighting; hardly a considerable village outside the oil region being without arc lamps. During his whole travels, however, he could hardly recall having seen one ship-shape, neat, or smart-looking post; everything having a temporary or expedient look about it which was very offensive to English eyes. Mr. Addenbrooke observed that there are more than a quarter of a million of arc lamps in constant use in the United States; but the whole future of American electric lighting enterprise in this regard rests upon a crude and simple basis. Nine-tenths of all the electrical work in America is done in this hand-to-mouth style. "In all this portion of work he saw next to nothing which showed particular ingenuity, skill, or brilliancy of idea. Simple and crude means everywhere used to effect in a rough and crude manner the end desired. In the means employed, there was little to excite admiration or interest; the interest lay in the fact that in such a simple and elementary manner so much had been done." This experience corroborates what we have repeatedly remarked respecting the alleged popularization of electric lighting in the States. It is merely because the American public tolerate conditions that would not be endured here, that electric light companies have been enabled to spread among them. We will not allow our streets to be spoilt by poles and wires merely in order that electric light speculators shall have an opportunity for doing a little trade. If these gentlemen were confronted with the requirements of an English local authority, they would give up the business just like the electric light companies of 1882 did over here. Mr. Addenbrooke plainly says that American electric light engineering would never do here; and we can readily believe it. It remains to be shown that electric lighting on the finished pattern of the new British companies working under the Board of Trade will pay to supply at the price that can be obtained for it. Nobody has yet proved this point.

Mr. G. Bower and the Lothammer Gas Company.—At the recent adjourned meeting of the Lothammer Gas Company, Limited, of which a report appeared in the Journal last week, a statement was made that Mr. G. Bower entered into his contract with the Directors conditionally on its being approved by the shareholders in general meeting. Mr. Bower entirely denies that any such condition was attached to it. He says: "On the day on which the contract was signed, the Directors were advised by their Solicitor, who was present, that they had the fullest power to enter into it, both by the Memorandum and Articles of Association, and, as an old contractor, I, too, satisfied myself that such was the case. One of the Directors wished to have the contract an optional one on their side, up to the day of the meeting of shareholders, which I declined, unless I also had a similar option; whereupon it was signed and sealed, and a minute made of the transaction. The contract was considered complete, and subsequently acted upon."

Metropolitan Electric Lighting Projects for the Ensuing Session.—Up to last Friday, the final day for the publication of notices of intended applications to the Board of Trade for electric lighting powers in the ensuing session, 160 notices had appeared. Of these, 23 relate solely to the Metropolis; the Orders covering practically all parts of London two or three times over, while in several instances they include areas for the electric lighting of which powers were granted last session. The London Orders for which application has already been made include two for Paddington, two for Fulham and Hammersmith, three for the City, two for North London, three for Westminster, and one each for St. George's (Hanover Square), St. James's and Pall Mall, St. Pancras, St. Martin's-in-the-Fields and the Strand, Lambeth, Wandsworth, Kensington and Knightsbridge, St. Giles's and the Strand, and North-West London. In addition to these, the London Electric Supply Corporation apply for an Order to light Islington, Shoreditch, Paddington, Bethnal Green, St. Luke's, St. George's-in-the-East, Mile End, Hampstead, Hammersmith, Fulham, and the greater part of London south of the Thames. The Metropolitan Electric Supply Company are also applying to light the City and parts of North, South, and South-West London.

Formation of a Gas Managers' Association for North Wales.—For some time past there has been a general feeling among the gas managers of North Wales that an association, similar to those which have been established in other districts, should be formed for the purpose of bringing them more into union. A preliminary meeting was held last August, when draft rules were submitted and amended. At a subsequent meeting, on the 15th ult., they were further considered; but, owing to the small attendance, it was decided to convene a special meeting to be held at Bangor on Friday next. On this occasion, in addition to the settlement of the rules, officers will be elected, and the place and date of the next meeting decided. There are already 18 members enrolled, and promises have been received from others; and there is no doubt that the new organization will be well supported, especially as it is proposed to admit foremen of works at half the ordinary fee. Among the initiators of the project are Mr. R. Dempster, of Penmaenmawr; Mr. T. T. Marks, C.E., Engineer and Clerk to the Llandudno Improvement Commissioners; Mr. T. B. Farrington, C.E., Engineer of the Conway Corporation Gas-Works; and Mr. J. Smith, Engineer of the Bangor Corporation Gas-Works who has temporarily undertaken the secretarial duties. It is to be hoped that all who can do so will be present on Friday, in order that the projected Association may have a good start.

The Abolition of Rebates on the Carriage of Gas Coals.—The Provisional Committee appointed to take action to test the soundness of the decision of the Railway Companies to abolish rebates hitherto allowed on the carriage of gas coals, held a meeting on Tuesday last, at the offices of the Birmingham Corporation Gas Department, Alderman Pollack (Chairman of the Birmingham Gas Committee) presiding. It was announced that contributions amounting to about £300 had already been promised by gas companies and corporations with a view to bringing the matter before the Railway Commissioners. It was proposed that a Working Committee, consisting of five members of corporation gas-works and five members connected with gas companies (with power to add to their number), should form the Working Committee; and the following gentlemen were unanimously appointed:—Mr. Alderman Pollack, Chairman, Gas Committee, Birmingham; Mr. E. O. Smith, Town Clerk, Birmingham; Mr. Alfred Colson, Gas Engineer, Leicester Corporation; Mr. Andrews, Chairman, Gas Committee, Coventry Corporation; Mr. S. Y. Shoubridge, Gas Engineer, Salford Corporation; Mr. Magnus Ohren, Secretary, Crystal Palace District Gas Company; Mr. W. Cross, Engineer, Leamington Gas Company; Mr. W. Belton, Engineer, Shrewsbury Gas Company; Mr. G. Helps, Secretary, Bath Gas Company: and Mr. J. Deakes, Engineer, Worcester Gas Company. The Committee will meet again to-morrow, at the offices of the Birmingham Corporation.

THE ACTION AGAINST MR. ELLIS LEVER.

(From our Manchester Correspondent.)

There is little to add to what has already been published in the Journal relative to the action commenced against Mr. Ellis Lever by the Salford Corporation. The law moves with leaden feet in a matter of this kind; and some time must necessarily elapse before the action can come on for trial. Meanwhile the customary preliminary steps are being taken. The defendant has entered an appearance to the writ, and the plaintiffs have taken the next needful step, of filing a statement of claim. At a meeting of the General Purposes Committee of the Corporation held a week ago, Mr. Mandley—whose latest proceeding is the support of the Union stokers and other workmen in their threatened strike against the decision of the Manchester Gas Committee in reference to the non-Union *employés*—endeavoured to obtain some information as to the extent of knowledge possessed by the Town Clerk. The result was not a conspicuous success. The Town Clerk flatly declined to say whether legal proceedings against the Bridgwater Trustees, who are large coal-owners, have been commenced. Alderman Dickens, the ex-Mayor, thereupon expressed surprise that, though a member of the Consultative Committee, he had not heard of any such proceedings being taken. To this the Town Clerk replied with the assurance that it was quite impossible for him to answer questions at the present stage. A good deal of information had, he explained, been imparted to him on the understanding that it was confidential. He was compelled to take it on the terms offered to him; and he was using his best judgment in dealing with it. The fact was nevertheless elicited that the arrangement with Hunter was that he should obtain information to enable the Corporation to recover certain sums of money, which he guaranteed should not be less than £10,000, and in respect of which guarantee he had deposited securities for that sum. This statement is much more clear and definite than anything hitherto said on this point. It was, however, far from sufficient to satisfy the inquiring mind of Mr. Mandley; and he will accordingly bring forward the matter at the next meeting of the Borough Council. A motion of which he has given notice is in the following terms:—"That, in view of the further light thrown by the Town Clerk and the ex-Mayor on the nature of the mode of carrying out the agreement made with the convict Samuel Hunter, and of the fact that, in addition to the proceedings taken against the nine firms named in the report of the Consultative Committee, writs have recently been caused to be issued against a well-known and highly-respected colliery company and an equally well-known large coal, &c., contractor, the Council is of opinion that a full and searching inquiry into the extent and nature of the alleged fraudulent transactions in connection with the Gas Department is absolutely necessary. That, as such inquiry can be carried out only by a Parliamentary Commission, it be an instruction to the Town Clerk to draw up a petition to Parliament praying for the appointment of such Commission, and to take the necessary steps to ensure its due presentation to the House of Commons." Mr. Mandley, by the way, denies that he is supporting Mr. Lever, who, he says, if guilty of bribing Hunter, has acted a "double lie."

Coal in Australia.—In the notice of the opening of the gas-works at Bairnsdale (Gippsland) which appears in another column, allusion is made to the possibility of soon finding local coal for use in the works. According to a letter from *The Times* Melbourne Correspondent, dated the 17th of October, some very rich coal seams had then just been discovered in the above-mentioned district, which appears to be exceptionally rich in natural resources. Mr. Reginald Murray, the Government Geologist, has reported on the discovery; and specimens of the coal taken from a seam more than 2½ feet thick near the surface have been tested, and found to be in every respect equal to the best Newcastle coal from New South Wales. Excellent indications of coal have also been discovered in other portions of the same country.

Electric Lighting in Berlin.—M. Wybauw, the Brussels Municipal Electrician, lately read a paper before the Belgian Electrical Society on the electric lighting of Berlin, from which the following particulars are taken. The light is supplied from central stations, the two principal of which are situated in Markgrafenstrasse and Mauerstrasse. Of the other stations one lights the Kaiser Galerie, and the other a block of houses at the corner of Unter den Linden and Friedrichstrasse; a fifth station, of but small importance, supplying Leipzigerstrasse. At the Markgrafenstrasse station there are eight steam-engines, each of 150-horse power, which drive sixteen Edison dynamos. To this plant there has recently been added four compound inverted engines, each capable of indicating 300-horse power, which drive direct four dynamos of 165 kilo-watts each. At this station there are eight boilers. The supply-mains are eighty in number, most of them having their coverings about three inches in diameter. At the Mauerstrasse station there are six boilers, three engines of 180-horse power each, and three of 300-horse power each. At the Friedrichstrasse station there are four engines of 60-horse power each; and at the Kaiser Galerie four of 80-horse power each. At the small station on the Leipzigerstrasse there are two engines of 80-horse power. The floor space required in the above installations for boilers and machinery is from 323 to 377 square feet per 1000 lamps. The totalle ngth of cables laid in Berlin is about 170 kilometres; and they are placed under the footpaths.

WATER GAS AS A POISON.

Water gas has been before the public again during the past week; but this time the point of interest in connection with the subject has been neither financial nor industrial. It is concerned with the death of two men on the premises of the Leeds Forge Company, under circumstances suggestive of poisoning by water gas. The inquest, which stands adjourned, was marked, as reported in the Journal last week, by a very extraordinary incident. A *post mortem* examination of the victims having been ordered by the Coroner, a party of surgeons, under the leadership of Mr. Thomas Scattergood, a surgeon, and Dean of Faculty at the Yorkshire College, assembled for the purpose in the band-room at the works, where the operation was to have been performed. There seems to have been an unusual number of medical men present on this occasion—a circumstance doubtless to be accounted for by the interesting character of the casualty under inquiry. Very soon after the commencement of the examination, one of the surgeons was observed to be strangely affected, and quickly became insensible. The operation appears to have been proceeded with; and it may consequently be supposed that the chest cavity of at least one of the subjects was opened in the usual way. At all events, one surgeon after another of the company fainted, or had to be led away to the open air, until the operation was perforce stopped for want of operators. After a day or two of interruption it was completed, under the shelter of an open tent in the yard; and portions of the bodies were given to Dr. Stevenson, of Guy's Hospital, for analysis. It is understood that at least three weeks will be required for the completion of this part of the investigation. As the Coroner's jury have not yet returned their verdict, for lack of the necessary information on which to base their opinion, it would be improper for anyone to express a necessarily imperfectly formed judgment as to the cause of the death of these unfortunate foremen boilersmiths. At the same time, people cannot be prevented from drawing conclusions in their own minds, in which it is inevitable that the connection between the water gas, for producing which the Leeds Forge Company have lately been so outrageously advertised, and the mysterious death of these smiths on the works with certain attending circumstances that strikingly recall American records of similar casualties, should loom most portentously clear. We do not recall any similar instance in English experience; and in all probability Dr. Stevenson will be largely guided in his analyses and report by American examples, of which there is no lack. It can well be understood, after all the nonsense about the innocuousness of water gas that he has lately uttered, that Mr. Samson Fox will be intensely solicitous to avert, by al possible means, the blow which an adverse report of Dr. Stevenson would be for him and the cause of water gas in England—at least as he has espoused it. We all remember Mr. Fox's foolish talk about the leakiness of the gas-fittings of ordinary houses, and the consequent waste of 25 per cent. of all the gas passing through the consumer's meter. If it should be established that these workmen of the Leeds Forge Company were killed by water gas—whether through an escape considerable enough to be detected by a sober man, or too small to make an explosive mixture with the air of a closed apartment in which a flame is at the time burning—it will be enough to condemn water gas entirely in the estimation of those who have followed Mr. Fox with more faith than judgment. He will have "killed his own child."

Fortunately for the interest of what may prove a valuable aid to the manufacturer and gas consumer, the discomfiture of Mr. Fox need not entail the discredit of an industrial product which can do better without than with his patronage. Because one man, for purposes of his own, elects to prefer altogether exaggerated and inadmissible claims for a commodity which he has temporarily taken under his protection, it is not for sensible people to forget the facts. Every competent engineer knows that carbonic oxide gas is a deadly poison, and that a mixed fuel or lighting gas which contains this constituent in notable proportion is not to be trifled with. Were any responsible engineer asked if he would undertake the general distribution of water gas containing 40 per cent. and upwards of carbonic oxide, he would reply that such a proceeding must be highly dangerous; and he would probably go on to declare that he must know what the term "distribution" was intended to cover. The odourless mixture of carbonic oxide and hydrogen, with a little carbonic acid and nitrogen, known as water gas, is so insidious that no engineer would be justified in recommending its general distribution for the purposes of interior lighting (by incandescent burners) and fuel, in the same way as coal gas is distributed. When carburetted with sufficient hydrocarbon to afford a brilliant light, however, it is claimed that it is rendered sufficiently odorous to notify its presence in the atmosphere, and therefore to be avoided. This is a claim that coal gas engineers have difficulty in accepting as removing all objection to the introduction into dwelling-houses, shops, &c., of a lighting gas charged with 40 per cent. of one of the most deadly poisons known to science. The difficulty is perfectly intelligible and reasonable; and as we have recently published so much about water gas under different aspects, it is only fair that we should say something about this, its most forbidding one.

The argument of the coal gas manufacturer is something like this: It is true that the unmistakeable odour of coal gas is a great safeguard, especially for consumers, who, in a general way, never smell it unless there is something wrong. Gas-fitters and others, whose clothes, tools, and hands are saturated with the smell of gas, frequently, however, find this rotection of no avail

for them, and get "gassed" before they are aware of their danger. In the great majority of cases, victims to the influence of coal gas in the atmosphere they have breathed, can be recovered with comparative ease upon removal to the open air, and the application of an emetic, or even a stimulant. If a consumer were to discover by the smell that a tap on a bracket or pendant in a room had been left open, there would be no danger in his entering the apartment, without a light, for the purpose of turning off the tap and opening the window. Now, how would it be in the case of carburetted water gas? The process of carburetting, of course, does not diminish its toxicity in the smallest degree. It is certain that inhalation to the amount that in the case of coal gas would only bring upon the human subject symptoms like those of alcoholic intoxication, would be fatal with water gas. The question then follows: How little water gas will take effect upon a man? Supposing it to be rendered odorous by carburetting, could a sober and wakeful man escape from a closed apartment into which his sense of smell tells him that the poisonous gas is escaping, or would he be overtaken by the deadly effect of the gas as soon as he could detect its presence? We have heard that very little water gas suffices to kill—that men have been found dead in apartments in which gas-flames yet burnt, and that a surgeon engaged in a *post-mortem* of a victim to water gas poisoning was seriously injured through smelling an opening into the chest cavity of the subject, which is always done when the possibility of alcoholic poisoning is suspected.

If all these questions are answered adversely to water gas strong in carbonic oxide, it still remains to be seen what the danger really is for ordinary consumers. If it is admitted that water gas is highly poisonous, and that it will kill men "before," as the phrase goes, "they know where they are," the question is whether, as a matter of fact, it is so hazardous as the records of occasional inquests would seem to indicate. The argument of the essential deadliness of water gas containing a high percentage of carbonic oxide has been much used in the United States in the course of the rivalry between the two sections of the gas interest. The coal gas men have condemned water gas as a murderous compound compared with which prussic acid is simply a healthy beverage, and dynamite an innocent plaything. The other side has stigmatized all these expressions of horror as "bunkum," and asserted that, when used with ordinary care, water gas is no more dangerous than coal gas; so that it is difficult to know what to believe. There is ample evidence to prove that, the proportion of fools in a community being constant, the process of elimination will receive a marked impetus from the substitution of water for coal gas. Desirable, for many reasons, as this result may be, we are not prepared to consider a commodity sold for the purpose of giving light with regard to its efficiency as an agent for reducing superfluous population. For this reason we are compelled, for considerations that have often been stated in these pages, to think that water gas is so far more dangerous to the community than coal gas, that any company changing from one to the other for the sake of private advantage incurs a grave moral, if not exactly a legal responsibility for the consequences.

At the same time, we must not shut our ears to the plea advanced by the water gas people to the effect that most of the deaths ascribed to the inhalation of carburetted water gas are open to qualifying explanations. The fact that the great majority of these casualties appear to have taken place in hotels, the character of which is never recorded, to people who are reported to have "blown out the gas" in their bedrooms before retiring, is alone sufficient to arouse reflection. Who are these peculiar people who blow out their gas? Are they people unable for the time to distinguish a gas-flame from the more familiar candle, or are they suicides, or victims of foul play? To put it shortly, in how large a percentage of water gas victims in America is the effect contributed to by the carelessness or wilfulness of the sufferer or others, and in how many cases is it fairly ascribable to the character of the gas or the misdeed of the gas company? Water gas advocates say bluntly that instances of the latter classes are very rare, even with the most deadly brands of water gas, the former largely predominating. They declare that in water gas towns suicides quickly learn the painlessness of water gas poisoning; but the many influences that lead to the hushing-up of crimes of this category prevent the matter being fairly explained, even if the materials for a satisfactory explanation exist, which is naturally rarely. And as to murders, the peculiar facility which the ready supply of carbonic oxide gas gives to acts of assassination under certain circumstances need not be further enlarged upon. This argument, or excuse, is not a safe one for water gas enthusiasts to use, however; because it might be replied that Governments that place restrictions upon the distribution of material poisons would stultify themselves if they did not restrict, or, if that were impracticable, forbid the sale of an infinitely more dangerous gaseous poison.

We have been treating hitherto of water gas as sold for lighting in some American towns by water gas companies. It now remains to discuss briefly the condition of affairs when water gas is mixed with coal gas previous to distribution, as it is in many American towns, and may possibly be in some English towns before long. We should like an answer to the question whether any of our United States or Canadian readers who sell the mixed product have met with any trouble in consequence of the increased proportion of carbonic oxide in the gas. At present we have no information upon this point, beyond the general notion that the increase of danger is not noticeable by the consumers, the coroner, or anybody else. It is hard to believe that the doubling of the 9 per cent. or so of carbonic oxide in ordinary coal gas can lead to any serious results. It is difficult, of course, to assign any particular reason for drawing the line at a maximum proportion of carbonic oxide; but whether it is fancy or well-grounded prudence that inspires the idea, we should, as at present advised, shrink from all proposals to increase the proportion of carbonic oxide beyond 20 per cent. for any town. Coal gas with this proportion of carbonic oxide would, of course, be more deadly to inhale than that now made. It would entail upon those responsible for the alteration the necessity of correspondingly heightened care to prevent the "gassing" of men in the works and pipe-trenches; because a larger proportion of the men thus attacked would certainly succumb. A very much slighter attack of "gassing" than men at present endure and return to work after, would have to be regarded as incapacitating them for the remainder of the day, on account of the fact, that while coal gas merely intoxicates and asphyxiates, carbonic oxide poisons the blood. All the change would, however, be for the men employed in and about the works; the consumers would not be likely to notice it. So the rationality of the matter would lead us to think; but it is a point on which, as already remarked, precise information is desirable from those who are best able to give it. Masked by 80 per cent. of coal gas, with its characteristic odour, it seems improbable that 20 per cent. of carbonic oxide can be particularly mischievous. If compared with coal gas innocent of any such admixture, it would doubtless appear dangerous; but when it is only a case of increasing 9 or 10 per cent. to 18 or 20 per cent., the question is reduced to one of degree, which can be debated without dragging in irritating "principle," which, as the satirist remarked, is seldom heard of unless interest is also involved.

Death of Mr. W. Ware, of Maidstone.—We regret to have to record the death, under very distressing circumstances, of Mr. W. Ware, Manager of the Maidstone Water Company, who committed suicide by hanging himself on the evening of Saturday, the 23rd ult. Mr. Ware was appointed in 1860; and, by his energy and skill, succeeded in bringing the works into their present state of efficiency. At the funeral, which took place last Wednesday in Maidstone Cemetery, every manifestation of respect was shown; Mr. Alderman Ellis attending on behalf of the Company, and all the local institutions being represented.

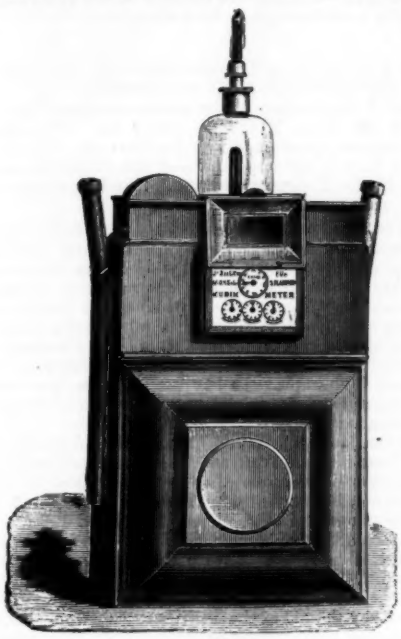
The Dangers of Electric Wires.—About eight o'clock last Thursday morning, a fire broke out in the business portion of Boston (U.S.A.), and spread with such rapidity that before its ravages could be checked about 25 massive buildings, covering something like two acres of ground, were destroyed. The losses are estimated at $5,000,000; about 300 separate business firms or agencies being sufferers. Two firemen lost their lives by being buried in the ruins. The origin of the conflagration is reported to have been the crossing of two electric wires, whereby the igniting current was liberated. The inquiry into the circumstances attending the death of the lineman Feeks, which was recorded in the Journal for the 12th ult., has been concluded without the jury being able definitely to fix the responsibility. They expressed the belief that the death was directly due to the practice of stringing electric light wires upon the same poles with telephone and telegraph wires. They said they could not too strongly condemn this practice; and called the attention of the Court to its danger. Not only was it, they said, a constant menace to linemen; but also, by the breaking of a wire, contact between it and an electric light wire might be established, which would conduct into any house or office a deadly current over a telephone wire. Last Saturday, a clerk was killed instantaneously by a shock from an electric wire connected with an arc light outside a shop.

The Seine Water as a Cause of Typhoid Fever.—The Paris *Bulletin Officiel* contains a report addressed to the Prefect of Police by Dr. A. Olivier, with reference to the prevalence of typhoid fever in the city. Dr. Olivier compares the statistics of mortality from the disease since January, 1888, up to the present time; and shows that from that month up to July of last year they exhibited a steady decrease—the number of deaths being 160 in January and averaging only 65 for the next five months. There was an increase in July, to 84; but the mortality again fell to 52 in August. The statistics for the present year show that up to the 1st of July there was a further improvement; there being only 39 in March and 36 in April. But from July the mortality went up to 110, and in August to 117; while there were 53 in the first half of September. Examining the question as to how the water in Paris has been distributed during the past two years, Dr. Olivier points out that the substitution of river for spring water is at once followed by an increase in mortality; and, comparing the present proportion between the total of the population and the number of gallons of water distributed, he says that, taking the last census of Paris (which gave 2,260,945 inhabitants) and allowing rather more than 2 gallons of spring water per head, the consumption will be about 5 million gallons. The quantity of spring water brought into Paris is, on the other hand, 32 million gallons. Dr. Olivier's conclusion is that, in order to avoid the waste of spring water, none should be supplied to industrial establishments, stables, &c., or for the watering of the streets, and that in private houses it should be used solely for drinking purposes. In this connection, it may be mentioned that a Bill is to be submitted to the Assembly to authorize the utilization of the sources of the River Avre for the supply of the city.

Notes.

A Test-Meter for Gas Purification.

The accompanying illustrations show an apparatus designed by Herr Ledig for indicating the working of gas purification in a more perfect manner that the usual tests. It depends upon the regular passing of a band of prepared test-paper through a continually renewed stream of gas. The arrangement is very simple; the basis of the apparatus being an ordinary dry meter. The top of the meter is enlarged to form a chamber in which a train of



clockwork winds the test-paper through a mercury seal into and through the glass gas-holder shown in the drawing. The gas passing through the holder may be consumed by a simple burner. The test-paper is divided into centimetres, and when once the proportion between the speed of the clock-work, and the rate of flow of the gas has been determined, it becomes easy to decide, in the event of a stain appearing on the paper, when and for how long foul gas was passing. The illustrations, which almost dispense with description, so clearly do they show the character of the apparatus, originally appeared in the *Journal für Gasbeleuchtung*, to the Editor of which publication we are indebted for the loan of the blocks. The instrument is manufactured only by Max Kohl, of Chemnitz.

Smoke and Haze.

Mr. F. A. R. Russell has contributed to *Nature* an article on the causes and character of atmospheric haze; distinguishing it from the fog which it in some respects resembles. The author says that, unlike fog, haze commonly occurs in this country when the lower air is in an unusually dry state. It is not only a frequent accompaniment of a spell of fine weather, but may be an occasional sign of its approach. It is exceedingly common on the east coast of Scotland, especially in spring, and during the prevalence of east wind. Mr. Russell discusses the phenomena of "neutral bands," by which term he refers to the tract of country lying between places where opposite winds are blowing. This condition of neutrality seldom lasts long—one or the other opposing wind always prevailing. In a suburb of London, such a band is sometimes signalized by a dense yellow haze, producing great darkness, the result of a banking up of smoke to some altitude, together with the condensation of aqueous vapour by the mixture of air currents of different temperatures. Mr. Russell states that he has known a west wind to prevail at Richmond, simultaneously with an east wind in London—both places being clear; while at Wandsworth, between the two, a calm continued for many minutes, attended with dense, almost nocturnally-black smoke-fog. In this case, the wind pressure in each direction was apparently equal. Generally speaking, the mist thus produced at the junction of the two winds is exceedingly dense in winter, and thinner in summer. This explanation may account for some of the partial and sudden fogs which occasionally put such a heavy strain on the gas-distribution arrangements of the Metropolis. In London, Mr. Russell thinks a wet north-easter has extraordinary virtue in clearing the air of mist and fog. After all, however, although mist and fog appear to originate under different atmospheric conditions, they seem to be much the same in nature and effect.

A Water-Jacketed Flexible Tube.

Mr. F. J. Smith, of the Midland Laboratory, Trinity College, Oxford, describes in the *Chemical News* a home-made variety of gas-proof india-rubber tube which he recommends as useful when it is desired to conduct through flexible tubes any gas which affects vulcanized rubber. It simply consists in jacketing one tube with a larger one of the same description and filling the space between with water or any other neutral fluid. The smaller tube is drawn through the larger one, and the ends are furnished with a small length of glass pipe fitting the inner tube. One end of the double tube is then securely whipped on the glass pipe; and after the fluid has been introduced into the annular space, the other end is fastened off in the same manner. In this way the fluid-jacketed flexible pipe is constructed, and effectually prevents any transfiltration of the enclosed gas. This method of constructing a gas-tight flexible tube is recommended for laboratory use; but there are evidently other purposes to which the same device might be advantageously applied.

Technical Record.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

The Eightieth Quarterly Meeting of this Institution was held last Saturday, at the Memorial Hall, Manchester. The President (Mr. T. Banbury Ball, of Rochdale) occupied the chair; and there was a fair attendance of members.

Minutes of Last Meetings.

The Honorary Secretary (Mr. Samuel S. Mellor, of Northwich) read the minutes of the last ordinary meeting, held on Aug. 31, at the Alexandra Hotel, Bradford, as well as of the special meeting on Monday, Sept. 30, when the members visited the Manchester Ship Canal works.

On the motion of Mr. W. W. Hutchinson (Barnsley), seconded by Mr. C. Wood (Bradford), the records were approved.

New Members.

Mr. David Swallow, Engineer of the Bradford Corporation Gas-Works, and Mr. J. B. Fenwick, Manager of the Windermere Gas-Works, were elected members of the Institution.

Election of President.

Mr. J. Braddock (Radcliffe) said he had been asked somewhat unexpectedly to propose the election of President for the ensuing year; and though he did it most cordially, he should put it in very few words. The name he had to submit was that of Mr. W. W. Hutchinson, of Barnsley. Mr. Hutchinson had served the Institution in various capacities—first as Honorary Secretary, and afterwards as Vice-President; and in other ways he had shown his interest in the Institution, and his desire that it should be prosperous. There could be but one opinion as to his suitableness for the post of President; and he (Mr. Braddock) cordially proposed the resolution.

Mr. J. Mackenzie (Wilmslow) said he had pleasure in seconding the resolution. Mr. Hutchinson was so well known to them that it was unnecessary to say a word in his praise; and he was sure the motion would be carried unanimously.

The President remarked that, to some extent, this was a formal resolution, because Mr. Hutchinson had been elected to fill the office of senior Vice-President; and he naturally looked forward to the only other promotion which was open to him in connection with the Institution. But so far as his experience of the members allowed him to speak, they were all agreed as to the fitness of Mr. Hutchinson for the office for which he was now proposed.

The resolution was carried by acclamation.

Mr. Hutchinson, in reply, said he was very much obliged to the members for the honourable position to which they had elected him. He accepted in their entirety the kindly expressions which had been used towards him by the mover and seconder of the resolution, as well as by the President. Fortunately, he had hitherto been blessed with good health; but in these days of increased calls upon gas managers, time was rather precious. Owing to the conflict between capital and labour, and other matters, more was now exacted from members of their profession than was formerly the case; and this made it more difficult than

previously to devote attention to the interests of the Institution. He nevertheless hoped to have time to fulfil the duties in a satisfactory manner; and at the end of the term, he trusted to have the approbation of the members. At all events, he should do his best to fill the office (which in times past they had conferred upon his father), and should endeavour to follow in the most worthy footsteps of previous occupants of the chair.

Mr. Haddock's Paper on "Water Gas."

The next item on the *agenda* was the discussion of the paper read at the Bradford meeting by Mr. W. S. Haddock, of Warrington, entitled "Notes and Extracts on Water Gas" (*ante*, p. 450).

The President said they should be pleased to hear some remarks from Mr. Newbigging on the subject.

Mr. T. Newbigging (Manchester) said he was sorry the President had called upon him to speak on this subject, because he did not care to add anything to the discussion of the question of water gas. It was like flogging a dead horse to attempt to answer the absurdities which they had listened to during the last twelve months; and it was moreover very like kicking a man when he was down. He considered that, both from an economic and a scientific point of view, the able paper by Mr. J. Ferguson Bell read at the meeting of the Midland Association of Gas Managers, and the subsequent articles of Mr. Denny Lane had completely pulverized—he would not say water gas, because they knew that water gas had its uses—but the gross exaggerations that had been spoken and written concerning water gas. Looking at these exaggerated and unjustifiable statements, one did not know which was the more astounding—the ignorance or the temerity (not to use a stronger word) of those who published these statements. The whole thing in his opinion had been a disgrace to English commercial life. With regard to the paper of Mr. Haddock—whose absence from the meeting he regretted—he thought they were much indebted to him for the information he had collected, and which would be useful for reference on future occasions.

The President said he was of Mr. Newbigging's opinion that it was hardly worth while to waste words over the exaggerations which had been put forth on behalf of water gas. But he did think it had been a good thing that their attention had been drawn to it, and that they should know distinctly its exact worth as a heating agent, and whether it was likely to come into use economically on this side of the water. He confessed that it was with envy he read of producers attended to by cleanly mechanics who seemed to have little else to do than to turn a tap to let in the steam, and then to reverse the tap to shut it off. When he thought of the small army of stokers, wheelers, and firemen who peopled a retort-house, this prospect was indeed one of a very pleasant character. But after all, the question was one of pounds, shillings, and pence; and under existing conditions, he thought the material necessary for the economical production of water gas put it entirely beyond reach. If the time ever came when the material could be purchased at such a figure as was recently mentioned in one technical journal, perhaps they might devote some further attention to it But under present conditions, he saw no chance whatever of its production being brought below the cost of ordinary coal gas; and, so long as these conditions remained, there was not much chance of its adoption in gas-works as they existed at present. He should have been glad if Mr. Haddock had been present; but many of them were at this time of the year so closely occupied at home that there was every excuse to be made for the rather thin attendance at the meeting.

Mr. Hutchinson remarked that there were two gentlemen present (Mr. W. Foster and Dr. Hurter) who were experts in chemistry; and it was possible that they might have something to communicate upon this subject which would be of value to the members.

The President was sure the meeting would be delighted to hear either of these gentlemen on the subject of water gas—not in regard to its application outside the lines of their own profession of gas managers, but as to how far it was likely to find any application within those limits.

Mr. Hutchinson said one question was, What is the lighting value of water gas used with the Fahnejelm comb?

Professor Foster was sorry to say he could not reply to the question. It was a very important one, and one which he went down to Windsor in order to get an answer to. He had the pleasure of meeting Mr. Samson Fox there, and of spending a very pleasant hour with him; but they did not come to any conclusion as to the lighting value of water gas with the use of this particular comb. One was left at his laboratory; but he had never had water gas or a sufficiently near representative of water gas in his experimental holder, and he had not therefore had an opportunity of testing it. They professed to be giving at Windsor, in a room 12 feet square, a light of 20-candle power. There was a very fair light; but the number of burners it would not be fair to discuss—they were numerous. The light was certainly not 20 candles. At all events, he took a very considerable amount off in giving a rough estimate, which did not at all satisfy the representative of Mr. Samson Fox.

The President took it that the light would largely depend upon the age of the combs, and the length of time they had been used.

Mr. Isaac Carr (Widnes) then read a paper on "The Dinsmore Process," which will be found on p. 1060. A long discussion followed, a report of which will be given in a subsequent issue of the Journal.

It was afterwards agreed to take as read a paper by Mr. Thos. Newbigging on "The Utility of Water in Gas Manufacture." This paper appears to-day on p. 1064.

Mr. Hutchinson moved, and Mr. Carr seconded, a vote of thanks to the President, which was heartily carried.

The President, in acknowledging the vote, said that, though he had been unwell of late, he should have been exceedingly sorry to have missed the interesting paper of Mr. Carr, and the discussion upon it.

This ended the formal proceedings.

The members afterwards had tea together at the Victoria Hotel; and subsequently went through a short toast-list.

SOUTHERN DISTRICT ASSOCIATION OF GAS ENGINEERS AND MANAGERS.

At the close of the reading, at the recent meeting of the above Association, of Mr. John Methven's paper on "Photometry," given in the last two numbers of the Journal (pp. 968, 1011), it was decided, in view of the importance of the subject, to adjourn the discussion till the February meeting. The following remarks were, however, made upon the paper:—

The President said he had listened with a great deal of pleasure to Mr. Methven's excellent paper. It certainly must have taken him a great deal of time to prepare all the diagrams and drawings and the elaborate details that he had entered into—indeed, one could hardly conceive the amount of trouble that they entailed. The subject was one in which they were all directly interested. The Engineers of the South Metropolitan Gas Company were passing through the thraldom of changing photometers. They might be altered and improved; but the question was whether they were not being improved in the wrong direction. He trusted there would be a good discussion.

Mr. W. T. Sugg (London) said he thought the members would be prepared to hear a few words from him on this subject, because, as they were aware, it was one that he had studied in various ways for a great number of years; and he had contributed to the alteration of the photometers which the President did not seem particularly to like. The discussion of this paper, it appeared to him, ought to be taken at two or three different meetings. Mr. Methven had put together a work upon photometry, which would serve as a text-book for students who had to pass examinations in gas matters; and, by the aid of the diagrams, they would be able to gain a large amount of information—more than they would be able to obtain from a great many text-books. He was quite sure that it was impossible to discuss properly at that one meeting the questions Mr. Methven had raised in the paper. He thought he could himself keep on talking for something like two hours on the subject without making any great effort to do so, or exhausting the discussion of the many different points introduced. In looking through the paper, he had been wondering how it would be possible to take in the whole of the information in such a manner as to adequately discuss each of the questions Mr. Methven had brought forward. Each one was most important, and affected gas companies generally. With regard to the verification of the illuminating power of the gas as supplied to the public, in the first place, the author referred to the photometers employed. They had in the City of London a Board of Gas Referees; and they had the Gas-Works Clauses Act, which ruled, he supposed, over the greater number of gas companies, and its provisions were incorporated in almost every Gas Bill—except in London. In this Act it said that the Evans and Letheby photometers were to be adopted as the instruments by which all verifications of illuminating power should be made. It did not exactly describe these instruments; but it left what he thought it should leave—a sufficient margin for the alteration of the two instruments, so as to make them as perfect as anything could be made up to the present time. They had in the Evans photometer what Mr. Methven spoke about—the 100-inch bar, with the wide scale. By moving the gas, instead of the candles (which had been done in Holland), the result was to get the wide scale which Mr. Methven advocated—no doubt with very good reason. The scale of the Evans photometer was a very wide one; and with the distance from the candles to the disc, there was sufficient illumination on the disc, so that the slight modification of the position of the candles in the direction of, or away from the disc could be very readily appreciated. It was only natural therefore that attention should be paid to this, in order that an operator could make up his mind as to when the two sides of the disc were equally illuminated, and so that they might obtain the same results from a great number of operators. It was a constant practice of his—in making discs, for example—to have two or three, or even half-a-dozen men taken out of the works to adjust the discs, so as to see whether they had been made right; and they found that, by carefully preparing the discs so that the sides were perfectly equal in the amount of spermaceti left upon them, they would not get half a tenth of a candle variation in different comparisons. But with regard to the Evans photometer, there had been some statements made which he took the liberty of remarking upon in the Journal of Gas Lighting some time ago, with respect to the form of the Evans photometer which was now used at Ladbroke Grove. The Evans photometer as it stood fulfilled all the requirements which were laid down by the Standards Department of the Board of Trade as a standard instrument—that was to say, it was so made that any number of them could be exactly reproduced; so that in any room where they were fitted, the same results would be afforded by any

photometer. This was a very important thing, and a condition which was not fulfilled by the Letheby or any other open photometer, with the exception of the "Canadian" photometer adopted by the Canadian Government. In that case they made a room exactly of one size; and the "Canadian" photometer and a Letheby which was used in this room gave the same results. It thus amounted to practically the same thing as the Evans—except that in the one case the operator got inside the photometer, and in the other he stood outside. He (Mr. Sugg) thought the outside was decidedly the best position (laughter). He found that there was a great difference in the eyesight of persons working at photometrical observations. There were some who could better adjust the disc in a perfectly dark room than in a perfectly light one; and others who could better adjust the disc in a light room than in a dark one. This showed that the Gas-Works Clauses Act in recognizing these two distinct forms of photometer—although perhaps they did not know then that there was a difference in the sights of persons—seemed to have hit upon some form by which these two different defects and qualities of light could be both provided for in the making of photometrical experiments. The Evans photometer, if properly ventilated (as it could be), would give, he maintained, the most correct results that could be obtained from any form of photometer. It admitted of the improvement which Mr. Methven had shown them in the wide scale, because they could make the gas to move instead of the candles—in fact, it was open to any improvement that might be wanted in that direction. But he must say this in regard to the Evans photometer, that when it was first adopted by the Gas Referees, in 1869 or 1870, they prescribed an instrument as it was to be seen in his (Mr. Sugg's) office. They fixed the dimensions of the instrument, and arranged the way in which every one should be made. The consequence was that the whole of the London testing stations had them fitted up in just the same way. The first of these photometers was only 9 inches deep; and the later ones were 12 inches. The difference between the action of these photometers was great; and the narrow ones were not so well ventilated as the wide ones. This was a matter which might have been easily altered, if the Gas Referees had simply adopted the changes some years ago which they had now made, and let more air into the photometer. The Evans photometer would then have never required to be superseded by any other. Although Mr. Methven had not mentioned in his paper the alterations which had been made, he (Mr. Sugg) would do so. The changes which had been introduced in the Evans photometer were four in number. First, at Ladbroke Grove, there was a narrow photometer, which had had the funnels taken off the top, and holes made in it for the ventilation of the gas and candles. The disc was fixed, and the candles moved. The second modification was in the district of the Commercial Gas Company; and in this case the photometer was 12 inches wide, the disc was fixed, and the candles were moveable as at Ladbrooke Grove. But the two instruments did not give the same results. The third modification was at Cloth Fair. In that case, the photometer was made with the candles and the gas fixed, and adjusted according to the "Instructions" of the Gas Referees. The disc here was moveable. This was also a wide photometer. The fourth alteration was in the photometer at Hill Street, Peckham; and this was one that the President was rather "down" upon. It was a narrow photometer—only 9 inches wide—with the disc moveable, and the gas and candles fixed. Here then they had four modifications in London alone, besides the Evans photometers of the original pattern. Mr. Methven pointed out that, with these modifications, it was difficult to know exactly what quality of gas was being supplied to the public. Then they had a difference in the open-bar photometers, as they were called. The "Canadian" photometer had a chamber of the same dimensions all the way through, like the Letheby photometer at Lambeth, with the result that Mr. Methven had described, which was not at all favourable to the gas. Then they had another instrument known as the "Tooley Street" photometer. This was very much like the Letheby; but with important modifications at each end. The lights were enclosed in towers; and the space between the two towers, where the disc travelled, was open. The next modification of this was what was called the "Tower" photometer, in which the lights were placed in two towers—one at each end—and the disc worked in a tube, which was enclosed. Then they had the different forms of the Letheby photometer in use in London. Mr. Methven said that these variations and alterations showed that the Gas Referees were not impartial Now there was one thing he should like to say in justice to the Referees; and it was this—that no Company, as far as he was aware, except the South Metropolitan Gas Company (and he thought The Gaslight and Coke Company had once) had made any complaint to the Referees about the photometers which were being used. His opinion was this, that if there was any idea on the part of the Gas Companies that the photometers by which their gas was tested were not proper instruments, and that they were not doing justice to the gas, an appeal to the Gas Referees should have been made by them; and then if they had shown any partiality after the appeal had been made, the matter would have been different. As to what Mr. Methven had pointed out with reference to the reflection from the back-board of the photometer, he did not think that any claim could have been made to that at all, because the Companies were entitled (he believed that was granted by the Gas Referees) to the whole of the light that came from the burner and from the chimney; and there ought to be no impediment placed between the light and that chimney which would in any way diminish the light from the gas. With regard to the openings in the screen, it seemed to him that the apertures from which the light should come ought to be made larger, because if they had an opening in front of a burner, and let the light fall through it upon any object, they would find that, as they decreased the area of the opening, so the amount of light that came from the burner and fell upon the object placed a distance from it, would be lessened in proportion to the lessening of the disc. He had made his remarks so long already, that he was afraid to trespass any longer on the time of the meeting. He told them when he started that, like Mr. Methven, he had studied the subject of photometry for many years; but to deal more clearly with the many points that the author of the paper had brought forward, would take too long, and so he should confine himself to the observations he had made.

Mr. Frank Livesey (London) said he thought they ought to heartily thank Mr. Methven for the immense amount of labour he must have given to this question. He was sure the paper would be very useful to gas engineers. But he was rather surprised that they should hear something in praise of the candle, because Mr. Methven was one of the leaders in the movement for finding a better standard of light. Mr. Methven now said that candles were reliable; but he (Mr. Livesey) believed they were not so. A few days since he was with one of the Gas Referees, testing gas with candles; and in the course of an hour's time, one test gave a result of 15·3 candles, while the next test, with another pair of candles, gave 16·2. This was a considerable difference; and the observation was made: "Well, the fact of the matter is this is an apparatus for testing candles, and not gas." With reference to the alterations made in the Evans photometer, he was of opinion that they were anything but satisfactory. If the Gas Companies were entitled to the value of the gas as it was determined in the old Evans photometer, they certainly did not get it in the new or altered form. This he could say most positively, because the gentleman to whom he had been alluding told him that it was most probable that the new form would give a candle less than was obtained previously. As to the new photometer Mr. Methven had introduced to their notice, it was impossible to give an opinion upon it until they had looked at it more minutely. There was this to be said about the Gas Referees—that they were studying the question of a new photometer, and had shown the Engineers of the London Gas Companies what they proposed, and which would do away with many of the objections mentioned by Mr. Methven. For instance, he (Mr. Methven) wished to introduce dry air to the burner. Now supposing they were testing with a 16-candle standard carburetted gas-flame, instead of candles, whatever the condition of the air, the gas to be tested and the standard gas-flame would be both affected alike. No correction for barometric pressure would be required; only for the temperature of the gas. There were also other special points about the instrument, which were perhaps difficult to explain without a diagram. It was of an entirely different form to the bar photometer, and was triangular in shape. It also met the objection raised by Mr. Methven in regard to the chimney surrounding the burner; for, instead of burning the fixed quantity of 5 feet per hour, and then ascertaining its value, the gas supply was increased or reduced until a 16-candle flame was obtained. The rate of consumption was then observed, and the illuminating power corrected to 5 feet per hour. By this plan, the proper size of chimney could be determined; and it would not require changing, as the flame was always a 16-candle one. Any photometer which, like the Evans pattern, gave certain results at the beginning of the tests with a gradual improvement as the instrument warmed up, could not be a correct means of measuring the illuminating power of gas. If gas companies, however, were entitled to have their gas tested in an Evans photometer of the old pattern, which gave a return of 16 candles, any new form of photometer ought to give the same value to the gas. He appealed to gas engineers in the provinces to help them in London, because what was being done in London would no doubt spread to other places. Mr. Methven's paper was a most valuable one; but to discuss each point raised therein would take a very long time indeed.

Mr. C. Greville Williams said the subject dealt with in the paper was a very large one, and intensely interesting. Many of the points raised by the author had astonished and delighted him; but he did not feel capable of discussing them at once. However, he would investigate and study in the laboratory the various questions brought forward by Mr. Methven. There was one thing which had been referred to in the paper—namely, the effect of moisture on flames. In connection with this, he might mention that some time ago he found that one of the testers every Friday watered the floor of the testing room—in fact, the floor underneath the photometer was saturated. From what he (the speaker) knew of the properties of water vapour, it seemed to him possible that the presence of moisture might take some of the energy out of the gas-flame; but as it would also do the same to the candle-flame, the final result of the presence of moisture in the air must be decided by experiment. The question of the action of moisture upon the illuminating power of the gas was one of very great importance; and he thought that in the future, they would have to give considerable attention to it. The London Gas Companies were undoubtedly being placed in a cruel position; and they would have to use every energy to see that what was being done was not more to their disadvantage than what had been done already. As he said before, he was not going to discuss the paper; but he had learned a great deal from it, and he warmly thanked Mr. Methven for it. He should most certainly pursue the subject

farther in his laboratory; and he hoped other chemists would do the same.

The PRESIDENT said that the paper was indeed a very valuable contribution to the subject with which it treated; and he thought it ought to receive full consideration at the hands of the members. He would suggest that the discussion should be adjourned to the February meeting; so that in the interval it could be thoroughly studied and experiments made, and then they would be in a position to deal with it in a more adequate manner.

The members having expressed concurrence in this proposal,

Mr. ROBERT MORTON (London) said he would move that a very hearty vote of thanks be given to Mr. Methven. They had been deeply interested in the paper; and personally he did not know how to characterize the surprise it had given him. Not only the question of the effect of moisture on the illuminating power, but the entire paper gave them material to reflect upon. Every member would, he was sure, cordially agree with his proposition.

Mr. J. L. CHAPMAN (Harrow), in seconding the motion, said that Mr. Methven had dealt with the question so fully that it was hardly possible to say anything further upon it. He had, however, placed before them much new material; and the best thing they could do was to go home and think over the matter during the next three months, when they would be better prepared to express their views on the subject.

Mr. METHVEN said he was much obliged to the members for the kind reception they had given to the paper he had read. He had hoped they would have been able to thrash it out thoroughly at this meeting, and so put an end to the strain that had been on his mind during the previous few days. But to a certain extent he felt pleased they had decided to withdraw any further discussion until a future occasion. In the meantime he trusted that what he had written would be with them all a subject-matter of deep consideration. He was thoroughly convinced that the Gas Companies of London must endeavour to strike now, or else they hardly knew what would be in store for them in the future. They had hitherto submitted very calmly, and accepted everything the Referees had produced in the shape of photometers. They had had various forms of photometers; and it appeared that they had not done with them yet. What the result would be, he did not know. However, he would reserve any further remarks until the termination of the discussion at the next meeting. He thanked the members for their indulgence and vote of thanks.

THE DINSMORE PROCESS.

By ISAAC CARR, of Widnes.

[A Paper read before the Manchester District Institution of Gas Engineers, Saturday, Nov. 30.]

The Dinsmore process has for its object the conversion of tar formed in the distillation of coal into permanent illuminating gas. This gas being generated in conjunction with the ordinary coal gas, increases the quantity and quality of the production over that of the ordinary method of carbonizing. It is not my intention to attempt to review the past history of this subject, as the universal failures met with in a retrospect of that history are, I am sure, well known to all, and have had the effect of producing in the minds of many, scepticism that will doubtless be manifest for a considerable time to come whenever this subject may be mentioned. I propose to-day to describe, as briefly as possible, the plant in operation at Widnes, and to recount some little of my experience in bringing the process to its present stage during the two years I have had the work in hand. I am aware that, in matters of this kind, every detail of experience is of interest and importance to gas managers; and, had time permitted, I would with pleasure have chronicled all these. But as this process is now attracting some attention in the gas world, I feel that I shall have occasion at no distant date to return again to the subject; so that my notes of to-day may be looked upon as somewhat introductory.

The diagrams before you represent the arrangement of plant now in use at the Widnes Gas-Works. The six retorts A (fig. 1) in each bed are charged with coal. The duration of the charges is six hours; and the work is done at hourly intervals. Supposing the process to be in operation, the whole of the taps C are open, and a heavy seal on the dip-pipes P forces the gas through, by way of the collecting chambers D, into the "duct" E, where a portion of the tarry vapours in suspension with the gas are, by the influence of heat, fixed as permanent illuminating gas. The velocity of the gases in passing through the duct is kept fairly equal by one retort being charged each hour as just stated. The duct is of fire-clay, and the regulation of the temperature therein is of importance, as on this principally depends the success or otherwise of the operation. I have so far found that the best results are obtained when the following graduations of temperature are, as nearly as possible, maintained:—Two-thirds of the length at the inlet end from 1700° to 1800° Fahr., or a bright cherry red, and cooled down at the outlet end to about 1200° to 1300° Fahr., or a dull red.

Some difficulty was experienced before such a degree of heat could be regulated and maintained in continuous working, for this secondary retort differs from the primary one, inasmuch as the latter receives the charge of coal evenly along the whole length—the work being thus equally distributed throughout; whereas in the former, where gases have to be dealt with, equal distribution of work with such an arrangement is not possible, as the instant the gases enter the duct, they attain the same temperature, or nearly so, as the duct itself, and after travelling along a few feet, the absorption of heat by the gases is practically *nil* as compared with that at the inlet. It will therefore be clearly seen that if the duct were heated in the same way as an ordinary retort, the result would be the reverse of what is required. The outlet end, having so little work to do, would become intensely hot, and the gases would, in consequence, become attenuated. Nor is this the only loss that would arise; for, with an excessive heat, the destruction of some of the ammonia in the gas must naturally occur. It may, perhaps, be argued by some that a shorter length of duct would better answer the purpose—that, by taking the gas out (say) half way along, it would not be deteriorated to anything like the same degree as by passing the whole length. This idea presented itself to my mind, and I tried it; but the results were unsatisfactory, for I found that continuity of contact at a reduced temperature was absolutely necessary to ensure efficient working.

In fig. 2, H H show the brickwork and air channels that are applied for graduating the heat. The function of the water-jacket pipe G is to check the deposition of carbonaceous or pitchy matter, which, with a plain pipe, has been found to block up solid in a few hours' time. As the expansion and contraction on the inner pipe are greater than on the outer one, an expansion joint is provided at G^1. Through this pipe and the bridge-pipe I the gas passes into the foul main, which completes the operation.

When it is required to open the duct for inspection, the taps C and the valve J are closed; the gas meanwhile passing up the ascension-pipes to the hydraulic main. Each of the taps C, of course, comes separately into action at the time of charging. Before opening the retort-door the tap is closed, to prevent the back-flow of gas from the other retorts, and opened when the retort is sealed. The valve J may be actuated from the ground floor by means of the rod and wheel K. The collecting chambers D are fitted with doors to give access for cleaning; but deposit here is slight, and requires little attention.

The top portion of fig. 1 shows a front elevation of a new stack containing eight beds or benches of single retorts. Four of these settings are complete, and have been in operation for some time past. There is one other setting on the Dinsmore system, fitted to a bench of through retorts, in another retort-house; making in all 35 mouthpieces on this plan now in operation. The additional expenditure in the cost of erecting these beds at Widnes was £7 per mouthpiece. One bed is connected with a separate condenser and meter; the gas being measured foul. The coals are carefully weighed; the make per ton being thus arrived at. The quality of the gas is ascertained by drawing off a small quantity—say 100 cubic feet—over a period of one or two hours; and this, after being purified, is stored in a small holder for testing. As I have previously stated, the retorts are charged at hourly intervals, so that there is very little variation in the illuminating power of the gas between the charges. The test, however, to which most importance attaches is the quality of the Dinsmore gas and ordinary gas together, as delivered to consumers; and this, at the present time (consisting of one-third of the former to two-thirds of the latter) averages 19 candles tested by Sugg's "G" Argand burner.

Some reference to the permanency of the gas after it is made will be expected of me; and I have to say, with regard to this, that it has been the custom at Widnes for more than twelve months past, when testing Dinsmore gas separately, to keep it for one or two days in a small holder exposed to the weather, in order to ascertain the depreciation in illuminating power due to storeage. Like all gases, the permanency to some extent depends more or less upon the state of the weather. During times of severe frost, the fall is greatest; while during mild weather, the gas is practically permanent.

The following table gives the results of a series of tests, extending over a period of seven days, of a sample of gas made from Arley Mine slack:—

Date, 1889.	Illuminating Power, Candles.	Average Temperature.		Description of Weather.
		Day. Deg. F.	Night. Deg. F.	
Oct. 17 . .	22·41	52	48	Rain; fog at night.
„ 18 . .	22·00	52	52	Cold, with fog.
„ 19 . .	21·91	52	46	Wind and rain.
„ 20 . .	—	49	46	Fine weather, but cold.
„ 21 . .	21·42	51	49	Cold, with rain at night.
„ 22 . .	21·39	52	49	Windy, with rain.
„ 23 . .	21·14	51	44	Weather fine, very cold.
„ 24 . .	20·39	44	—	Very cold day.

It will be noticed that the greatest fall in one day—0·75 of a candle—was between Oct. 23 and 24, when the temperature of the atmosphere was lower than on any of the previous days. There were 120 cubic feet of gas in the holder at the commencement of the tests; and at the finish this quantity had become reduced to 20 cubic feet.

This test I consider a severe one, as gas ordinarily is never stored in such small quantity; and it is well known that the greater the bulk, the less powerful in proportion are the atmospheric influences. That this gas is equal to the ordinary gas, in what may be termed both its storing and its travelling properties, I am satisfied, as I have had the quality checked at a distance of a mile from the works without any diminution being apparent.

In the earlier stages of the process, I had many disappointing experiences. True, I had in the first instance seen Mr. Dinsmore's small plant produce, without difficulty and in continuous working,

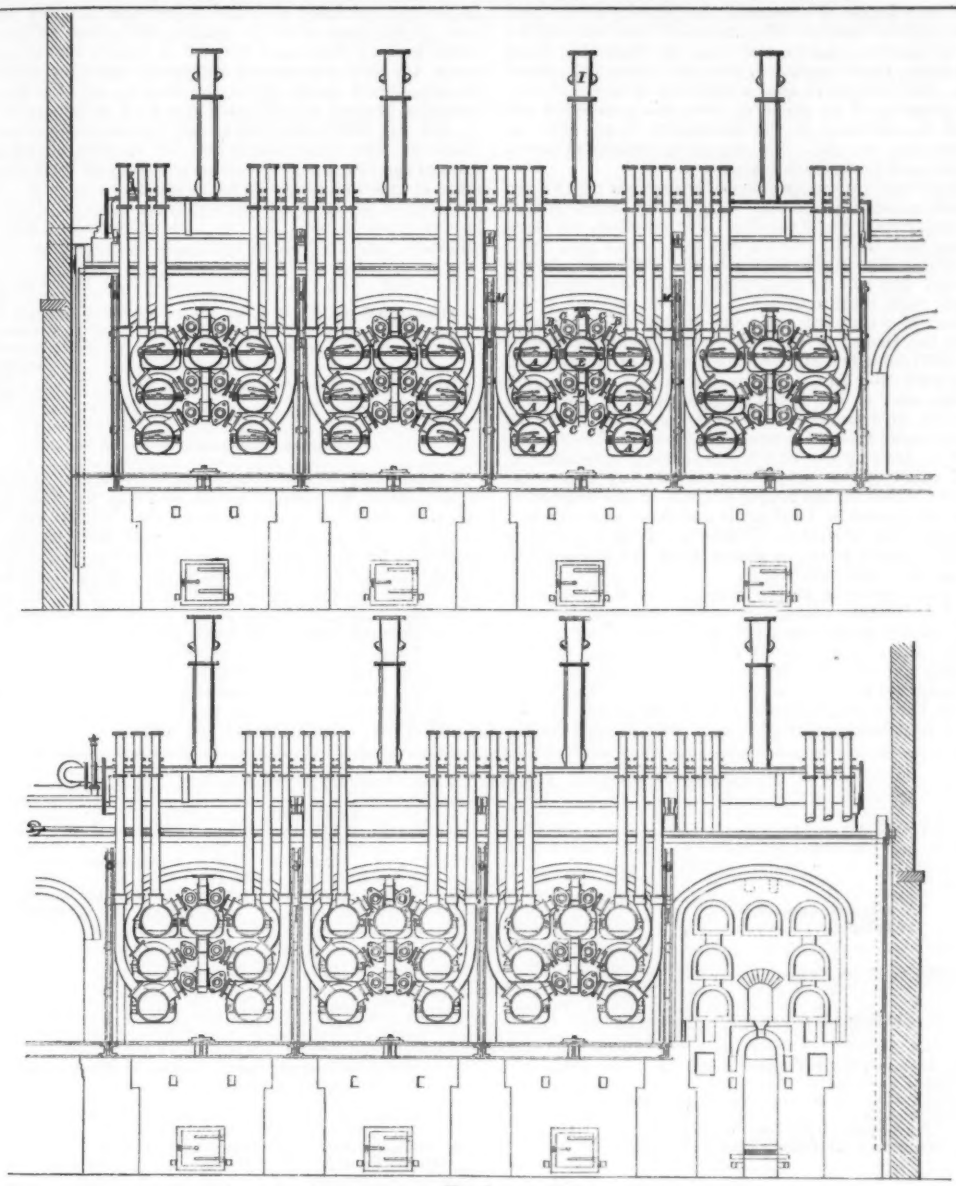


FIG. 1.

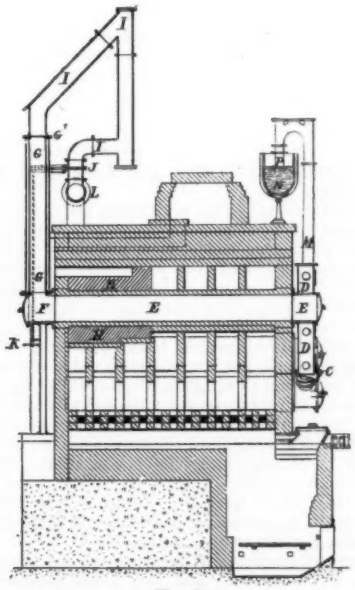


FIG. 2.

much better results than anything I have since obtained. But for a considerable time the working on a commercial scale was not a success; and not until the discovery of the fact that it was necessary to graduate the temperature of the duct were the results such as to offer much encouragement. Even then the deposition of pitchy matter in the outlet-pipes was greatly accelerated through having water-jacket pipes of insufficient capacity. At that time the arrangement of plant was different from that before you. The whole of the gas made was passed from the retorts up the ascension pipes to the hydraulic main, and brought down again into the duct together with a stream of liquid tar. The latter was admitted through a seal or U-tube, and falling on the bottom of the heated duct, was volatilized; the gases from it mixing and becoming fixed with those from the coals.

It is hardly necessary for me to say—more particularly to those gentlemen who have had experience in tar firing—that the stream of liquid tar requires some attention; but by the use of a good regulator and careful attention on the part of the men in charge, the process continued to work fairly well. However, the existing arrangement is an improvement, as it treats the tar in a gaseous state, and does not require any attention from the stoker, further than that of opening and closing the taps when charging, which cannot be said to be more than the attention needed by most anti-dip valves. One man does all the work in connection with two beds of retorts, at the same rate of wages as the men working the old plant. In fact, the cost of labour per 1000 cubic feet on the Dinsmore beds is actually less than in the other case, on account of the extra quantity of gas made per ton; the weight of coals in each case being about the same. A trial, extending over a period of eight weeks, of Abram Arley Mine slack resulted as follows:—

Coal carbonized		138 tons 9 cwt. 3 qrs.
Gas made		1,545,000 cubic feet.
Gas made per ton	Corrected for temp and pres. and the volume of CO_2 and $H_2S = 2{\cdot}75$ % deducted	11,240 cubic feet.
Illuminating power		21·32 candles.
Tar used or gasified per ton of coals carbonized		About 4 gallons.

To state with any degree of exactness the quantity of tar used is a somewhat difficult matter. The method I have adopted for checking it is as follows:—Take a coal—say, the Moss Hall Arley Mine, which I know, from experience, will yield about 12¼ gallons of tar per ton. The weight of coal carbonized is 2 tons 16 cwt. per day. The quantity of tar produced from this is collected and measured; and the difference in the production is put down as having been converted into gas. The measuring is extended over a number of weeks, and the average taken.

Results of tests from various qualities of coals show that all are capable of yielding increased results—in quantity about 10 per cent., and in quality from 4 to 5 candles. For instance, the Moss Hall Arley Mine coal, which, when clean and "fresh got," will produce in ordinary carbonizing upwards of 11,000 cubic feet of 16½-candle gas per ton, will by the process yield 12,000 cubic feet of 21-candle gas, with a consumption of about 30 per cent. of the tar. In the case of a common coal, such as that sold for steam purposes, from the Ormskirk or St. Helens district, ordinarily yielding about 9000 cubic feet of 15-candle gas, the production can be increased to 9800 cubic feet of 20 candles. If any of the highly bituminous coals, such as are found in some parts of the South Yorkshire district, or even cannel of good quality, is used, the foregoing proportionate rates of increase are found to obtain.

It is difficult to draw up any very comprehensive statement as to the financial value of this process, as scarcely any two works are situated alike either for the supply of coals or the disposal of residual products; but below I submit a statement showing how we are at present being affected at Widnes, and from it managers may estimate the benefits likely to accrue from the introduction of the process at their respective works.

For several years previous to the adoption of the Dinsmore system we used at Widnes exclusively Arley Mine cobbles, with 15 per cent. of cannel, producing about 10,600 cubic feet per ton of 18-candle gas; the average cost of the mixture being 8s. 10d. per ton. In May last (the time for the renewal of the coal contracts), I recommended that the cannel contract should be allowed to lapse, and the Dinsmore process be entirely depended upon for keeping up the illuminating power. So it was decided to buy 75 per cent. of Arley coal, and 25 per cent. of Arley slack. However, on the opening of the tenders, the prices of gas coals were found to have increased to such a degree, that to have bought again the coal and cannel previously used, or other of equal quality, would have raised the cost to 11s. 9d. per ton. The situation became critical, with gas at a selling price of 2s. and 1s. 10d. per 1000 cubic feet, on an annual make of 112 millions. There was very little margin left for so great an advance in the price of the raw material; and it was thought for a time that the price of gas would have to be advanced to meet it. However, a few tests of coals of common quality, some of which had never been previously used for gas making, opened a way out of the difficulty; and my Committee bought as follows:—

Tons.				
4,000 nuts	at 6s. 9d.	£1350 0 0	White Moss Coal Co., Skelmersdale.
2,000 Abram slack	„ 6s. 0d.	600 0 0	Abram Coal Co., Wigan.
3,000 Golborne four-feet	„ 8s. 3d.	1237 10 0	R. Evans and Co., Haydock.
2,000 Little coal	„ 8s. 8d.	866 13 4	Cross, Tetley, and Co., Wigan.
11,000		£4054 3 4	

Average price per ton delivered, 7s. 4½d.

I must point out that these coals, as in the case of those of better quality, have increased in price, although not quite at the same rate; but previous to the advance they could have been bought at quite 1s. 6d. per ton less than we are now paying. The gas-producing power of the above is as follows:—In ordinary retorts, about 9300 cubic feet of 16½-candle gas. By carbonizing one-third of it in the Dinsmore beds, 10,300 cubic feet of 20½-candle gas is obtained; making the total production in the whole of the works about 9600 cubic feet of 19-candle gas.

We have now had some months' experience of the working of this coal; and from the results obtained I have drawn up the following comparative statements showing the working on the old system with coals at 11s. 9d. per ton, and the present actual working with coals at 7s. 4½d. per ton:—

STATEMENT *showing the Working by the Ordinary Process only.*

		£	s.	d.
Coal .	8,981 tons, or 85 per cent., at 11s.	4,939	11	0
Cannel .	1,585 „ „ 15 per cent., at 16s.	1,268	0	0
	10,566			
	Average per ton, 11s. 9d.	£6,207	11	0
	To balance	9,990	9	0
		£16,198	0	0

This mixture will give 18-candle gas.

Cubic Feet		£	s.	d.
Gas produced, at 10,600 per ton = 112,000,000 cub. ft., at 2s.		11,200	0	0
Tons Coal. Cwt. Coke.				
Coke „ 10,566 × 8·247 = 4,356 tons coke, at 11s.		2,395	16	0
Tons Coal. Galls. Tar.				
Tar „ 10,566 × 12·27 = 636 „ tar, at 29s.		922	4	0
Sulphate of ammonia	140 „ „ at £12	1,680	0	0
		£16,198	0	0

STATEMENT *showing the Working with Two-thirds Ordinary and One-third Dinsmore Process.*

	£	s.	d.
Coal, 11,653 tons; average per ton, 7s. 4½d.	4,297	0	11
Cubic Feet. Cubic Feet.			
Dinsmore, 37,300,000, at 10,300 per ton = 3,621 tons coal			
Ordinary, 74,700,000, at 9,300 „ = 8,032 „			
Extra cost of carbonizing 1,087 tons, at 2s. 3d.	122	5	9
5 per cent. interest on additional capital outlay, £245.	12	5	0
	£4,431	11	8
To balance	11,749	2	0
	£16,180	13	8

This mixture will give 19-candle gas.

Cubic Feet.	£	s.	d.
Gas produced, at 9,611 per ton = 112,000,000 cub. ft., at 2s.	11,200	0	0
Tons Coal. Cwts. Coke.			
Coke „ 11,653 × 8·247 = 4,805 tons coke.			
less 5 per cent. on one-third = 74 tons = 4731 tons, at 10s.	2,365	10	0
Tons Coal. Galls. Tar.			
Tar (ordinary) 8,032 × 11·27 = 445 tons, at 29s.	645	5	0
„ (Dinsmore) 3,621 × 7·00 = 124 „ at 19s. 8d.	121	18	8
Sulphate of ammonia = 154 „ at £12	1,848	0	0
	£16,180	13	8
1s. per ton on 10,566 tons, the value of raising quality from 18 to 19 candles	£528	6s.	

To balance by ordinary process	£9,990	9	0
„ „ „ one-third Dinsmore process	11,749	2	0
Balance in favour of the Dinsmore process	£1,758	13	0

From these statements it will be seen that the charges or deductions against the Dinsmore process are as follows:—£122 5s. 9d. for carbonizing the 1087 tons extra weight of coal used. The coke, although we are getting the same weight as before, is not of quite so good a quality. For this I deduct 1s. per ton; also 5 per cent. on one-third, as the extra quantity required to fire the Dinsmore beds; the total deduction being £277 5s. Tar is in three items—first, the reduction in quantity due to lower class coals; second, the quantity gasified; third, the inferior quality of the surplus from the Dinsmore process. This deduction amounts to £243 9s. 4d. No deduction is made on account of sulphate of ammonia; for, on checking our make up to date, and comparing it with last year, I find a slight increase in the quantity of that product manufactured per ton. No allowance is made for what may be argued to be the extra cost in labour and retort power of carbonizing slack and small coals. There must, of course, be some difference; but with us it is not appreciable, for both men and retorts are doing the same weights now as were done previously, when nothing but coal and cannel were used. The solution of this is, I think, to be found in the fact that the coke from the slack is of good quality; and, in consequence, the heats of the retorts are kept up.

The interest on the additional capital outlay, £12 5s., completes the whole of the deductions. Therefore, leaving out the £528, which is a low estimate for increasing the quality of the gas from 18 to 19 candles, I find that we shall this year have an actual saving through the adoption of this process, of £1758 13s.—a sum equal to 4·1d. per 1000 cubic feet on the quantity of gas sold.

The value of this system to us, situated as we are so favourably for the manufacture and disposal of our residual products, is to be found in its light-producing power, as it admits of the use of coal of a lower quality than it has ever previously been deemed expedient to use. It is not necessary for us to apply the Dinsmore process to all our retorts. For example, let it be supposed that the whole of our retorts were on the Dinsmore plan, and that the use of the best Arley Mine coal had been continued. This would have brought up the make per ton to 12,000 cubic feet of 21-candle gas. To begin with, my Committee are not called upon to supply gas of such high illuminating power; then the increased production of gas per ton would diminish the quantity of coal carbonized in proportion. The loss of residuals from the amount of the reduction in the weight of coals must be placed to the debit, just as the extra production is placed to the credit; and an analysis of the statement will show that the residuals are just about as valuable to us as the gas; making it a matter of little consequence, whether the make per ton is great or small.

A great amount of interest will centre upon the theoretical and chemical parts of this subject; and this I am pleased to say has been inquired into by Mr. W. Foster, M.A., F.C.S., who has been specially engaged by the Dinsmore Gas Company to report upon the illuminating value, composition, and specific gravity of the gas made by their process. As the best way of elucidating this matter,

I have incorporated, as part of this paper, Mr. Foster's report, which is as follows:—

Nov. 20, 1889.

To the Directors of the Dinsmore Gas Company, Ltd.

Gentlemen,—In accordance with the instructions of your Secretary, I have visited the gas-works of the Widnes Corporation, and now beg to hand you my report on the Dinsmore process at present in operation at these works.

The observations were begun early on the morning of the 9th inst., and ended a little after noon on the 12th. The experiments were carried out regularly and continuously; and I have to express my thanks to the Manager (Mr. Isaac Carr) for placing at my disposal every means within his reach, so as to make my inquiry as thorough as possible. Every part of the plant was open to my inspection. Since my return, I have fully analyzed the samples of gas taken at Widnes; and as far as the time at my disposal has permitted, I have inquired into the character of the samples of tar, taken, like the samples of gas, by myself.

The plant which has been the special subject of my inquiry consists of a bed of six retorts, arranged vertically in two tiers of three each, with one duct, or heated chamber, situated between the two tiers at the upper extremity. All the gas that is produced in the six retorts passes through this duct, or central chamber, on its way to the condenser. Each of the lowest retorts in each tier was charged with 2 cwt. of coal, and each of the four upper retorts was charged with 2½ cwt. One retort of this bed of six was drawn and charged hourly; so that the coal in each retort was distilled for six hours. By this arrangement, gas from each charge, in every phase of the distillation, was entering the central chamber. When a retort was drawn and charged, the gas given off in the interval was bye-passed through the hydraulic main. In ordinary working, the gas passed through the system without the intervention of the hydraulic main. A special meter was connected with the bed of retorts, and the quantity of crude gas made during each consecutive 24 hours for three successive days was noted; the coal carbonized during each of those intervals being 56 cwt. The accompanying table gives the quantity of gas made:—

TABLE *showing the Quantity of Gas Made in 24 Hours from 56 cwt. of Coal.*

Date, 1889.	Crude Gas made in 24 Hours. Cubic Feet.	Temperature of Air adjacent to Meter. Deg. Fahr.	Temperature of Gas passing into Meter. Deg. Fahr.
Nov. 9	—	55	59
„ 10	32,320	55	59
„ 11	33,040	50	55
„ 12	32,160	48	51
Average	32,507	52	56

The barometer during four days spent at Widnes remained steady at 30·4 inches. The average of the foregoing results is a yield of 11,610 cubic feet of crude gas per ton of coal. This volume, when reduced to standard conditions of temperature and pressure, is 11,900 cubic feet. The total impurities (carbonic acid gas and sulphuretted hydrogen) in a sample of crude Dinsmore gas were found to be 2·75 volumes per 100 volumes. The coal used during the whole of these experiments was Abram Arley Mine slack.

Illuminating Power.—The tests of illuminating power were made with the closed type of Evans photometer; the standards employed being sperm candles and a 2-candle standard gas-flame with horizontal slot. The burners used for consuming the Dinsmore gas were a Sugg "G" Argand with thirty holes, a No. 4 flat-flame for cannel gases, and the standard "London" Argand. As far as possible, a determination of specific gravity was made concurrently with a test of the illuminating power; and as a special experimental holder, of a capacity of about 150 cubic feet, was used for storing the Dinsmore gas experimented on, I attach some importance to the figures obtained. The actual weighings were made in special apparatus of my own, with indications of which I am quite familiar.

TABLE *giving the Specific Gravity and Illuminating Value of Dinsmore Gas.*

[The candle power is reduced to standard temperature and pressure.]

Date, 1889.	Specific Gravity of Gas; Dry Air taken as Unity.	Illum. Power of Gas in Sperm Candles. Burner used, "G" Argand. Consumption 5 c. ft. per hr.	Burner used, No. 4 Flat-Flame. Consumption 5 c. ft. per hr.
Nov. 9	—	21·00	—
„ „	·435	21·72	—
„ 10	·431	21·00	—
„ „	·436	22·40	20·70
„ „	·428	—	—
„ 11	·428	22·30	—
„ „	·419	21·27	19·28
„ 12	—	21·00	—
„ „	·424	21·80	20·00

At the time of my visit, the town supply consisted of gas manufactured in ordinary retorts, but mixed with a certain proportion of Dinsmore gas; the latter being stated by Mr. Carr to be about one-third by volume. The following table gives some of the figures obtained by experiments with it:—

Town Supply.

Date, 1889.	Specific Gravity.	Illuminating Power of Gas in Sperm Candles. "G" Argand.	No. 4 Flat-Flame.	Standard "Lond." Arg.
Nov. 10.	·438	19·40	16·00	18·80
„ 11.	·420	18·60	—	—

The samples of gas taken at Widnes have been the subject of careful analysis. The results obtained are of great importance in enabling me to arrive at the character of the gas manufactured by the Dinsmore process.

TABLE *giving the Chemical Composition of Samples of Gas Manufactured at the Widnes Gas-Works by the Dinsmore Process.*

Description of Gas.	Crude Dinsmore Gas, made Nov. 12, 1889. Lighting Value by "G" Argand, after purification, 21·8 candles; sp. gr., ·424 (dry air = 1).	Purified Dinsmore Gas, taken from Experimental Holder Nov. 11, 1889 (Gas made the previous day). Illum. Power, 22·3 candles; sp. gr. ·428.	Town Gas, made Nov. 11, 1889. Illum. Power, 18·66 candles (one-third is Dinsmore gas); sp. gr. ·420.
	Volumes per 100 Vols. of Gas.	Volumes per 100 Vols. of Gas.	Volumes per 100 Vols. of Gas.
Carb. acid gas (CO_2)	2·75 This includes H_2S. After complete purification.	0·23	2·09
Heavy hydrocarbons	5·30	6·76	4·37
Carbonic oxide (CO)	7·78	8·10	8·44
Marsh gas (CH_4)	40·24	40·34	33·39
Free hydrogen	46·06	43·98	50·61
Free nitrogen	0·60	0·59	1·10
	100·00	100·00	100·00
Carbon density of heavy hydrocarbons	2·85	2·96	3·70 (?)
Hydrogen density of heavy hydrocarbons	6·08	5·80	6·30 (?)
Volumes of oxygen used per 100 vols. of gas	130·60	136·50	120·30
Volumes of carbonic acid gas produced per 100 vols. of gas. This is exclusive of CO_2 present in the gas as such	63·12	68·44	58·70

Permanency of Dinsmore Gas.—During my stay in Widnes, I invariably allowed gas to stand overnight in the experimental holder. On my arrival at the works on the following morning, I tested the gas both for lighting power and specific gravity. I did not observe any change in the character of the samples during my stay. The holder was under a shed, exposed laterally to the air, the temperature of which has already been given.

Impurities: Carbonic Acid and Sulphuretted Hydrogen.—The quantities of these gaseous impurities in a sample of the crude Dinsmore gas, amounted to 2·75 volumes. In a sample of the town gas, having an illuminating power of 18·66 candles, the carbonic acid gas was 2·09 volumes per 100 volumes.

Tar made by the Dinsmore Process.—I took two samples of tar—one, that of the works generally, and consisting of one-third Dinsmore tar; the other, pure Dinsmore tar as it drained from the condenser. The Dinsmore tar is decidedly the more viscous of the two. I have distilled each for the purposes of comparison, and have obtained from 100 volumes of each the following quantities of water and light oils, including naphthas:—

	Dinsmore Tar.	Ordinary Tar. (One-third Dinsmore.)
Water	10·3 per cent.	4·1 per cent.
Light oils	3·6 „	6·2 „

There is no doubt that the increased illuminating power which Mr. Carr obtains by means of his apparatus is, in a great measure, due to the rendering of some of the more volatile portions of the tar permanently gaseous; but I do not at present regard this statement as a complete answer. The heavy oils of the tar are capable of being made to contribute to the lighting value of the gas; and I have no doubt that in this case a decomposition of such oils has been effected. A study of the tables I have herewith supplied will furnish much useful information; the lighting value of a particular sample of gas bearing some relation to the heavy hydrocarbons, the total oxygen needed for combustion and the total carbonic acid gas produced. What I wish to imply is that the figures obtained are all more or less in agreement. So far as I have examined the tars, the Dinsmore is richer in heavy oils, including naphthalene, than the ordinary tar, and contains more free carbon. The chemical character of the Dinsmore gas does not warrant any belief that it will be specially prone to deposit naphthalene.

I am much impressed with the simplicity of Mr. Carr's method of working the process; and I have no doubt that the merits of the system are such as to warrant gas companies in giving it a trial.

(Signed) WM. FOSTER, M.A., F.C.S.

The whole of the patents in connection with the Dinsmore process are the property of the Dinsmore Gas Company, whose offices are at 12, Hackins Hey, Liverpool.

THE *Electrical Review* asks: "When is the lighting of London from Deptford to commence? The delay must have the effect of making the shareholders anxious; and we notice that the quotations for shares of the London Electric Supply Corporation are steadily lacking—£5 shares being now quoted 4⅛ to 4¾."

THE UTILITY OF WATER IN GAS MANUFACTURE.

By Thos. Newbigging, C.E.

[A Paper presented to the Manchester District Institution of Gas Engineers, Saturday, Nov. 30.]

The first useful part water fulfils in the process of gas manufacture is the work which it does in the ash-pans under the retort-furnaces. Raised to boiling-point by the glowing coke, it gives off steam in considerable volume; and this rising underneath and between the furnace-bars, contributes to the durability of these by keeping them in a state of comparative coolness. At the same time it tends to prevent or mitigate the soldering together of the fused portions of the fuel. In its passage through the hot coke, the steam is decomposed into its constituent gases; the hydrogen adding to the furnace fuel, and the oxygen promoting combustion. A tidy fire about, with the ash-pans charged with water and reflecting the bright fire between the bars, is one of the characteristics of good stoking. In the absence of this, though the settings were composed of gold and diamonds, the best results would not be obtained. Dirt and disorder are indicative of general bad working.

In the slaking or quenching of hot coke, water is a necessity. It is true that if the coke is drawn from the retorts into iron barrows, and a close cover placed over it, the confined gases in the absence of atmospheric oxygen, will smother and gradually arrest combustion in the mass; and some managers resort to this method of dealing with the coke with a view to abating the nuisance of the escape of steam, charged with sulphurous vapours, from the retort-house, and to preserve the coke for sale in a dry and bright condition. Where the production of coke is great, however, as in the case of large works, this is an inconvenient, if not an impossible method of dealing with the material. It is to be noted further that the quantity of water absorbed by the coke when it is slaked in the ordinary way is comparatively small, not exceeding on the average 14 per cent. of the weight of the coke in the first instance and the bulk of this evaporates when the coke is deposited outside the retort-house in the open air; about 3 per cent. being permanently retained.

The water which is found in the hydraulic main is due to the condensation of the vapour or steam which, coming from the retorts, is carried up the ascension-pipes along with the permanent gases and the heavy hydrocarbons; the latter being deposited as tar. The presence of this water is accounted for by its previous existence in the interstices of the apparently dry coal. It is also produced synthetically by the combination, brought about by the heat of the retorts, of a portion of the oxygen and hydrogen—two constituents of the solid coal. The quantity of water thus yielded varies with different coals, but the average yield may be set down at 16 gallons per ton. In my previous paper,* I explained that a portion of the steam from wet coal is decomposed in the hot retorts, being resolved into its constituent gases. It will be seen, therefore, assuming the correctness of this hypothesis, that two opposite processes are being carried on simultaneously in the retorts—the analytical and the synthetical; and this apparent inconsistency may be explained by the original character of the substances acted upon—the steam in the one instance, and the gases oxygen and hydrogen in the other—and their proximity to, and period of contact with the hot surface traversed by them. It is, in fact, another case of blowing hot and cold with the same breath.

The strong affinity which exists between this water and the ammonia impurity in the crude gas causes the absorption of much of the latter by the former; and hence the ammoniacal liquor, which is, roughly speaking, a solution of ammonia. This, again, by reason of its affinity for sulphuretted hydrogen and carbonic acid, absorbs a proportion of the gases named, reducing the amount of these impurities in the gas; and thus is produced the complex liquid designated "ammoniacal liquor." In all well-regulated works, the ends of the dip-pipes in the hydraulic main are sealed with this liquor in preference to tar, which not only offers greater resistance to the passage of the gas, but robs it to some extent of its richest illuminating substances—the volatile hydrocarbons—which would otherwise be retained in the gaseous condition. This liquor performs similar functions in the washers and scrubbers, where, in the finely-divided state, its quality of absorbing ammonia, sulphuretted hydrogen, and carbonic acid is still further utilized.

In hot climates the crude gas can best be reduced to the temperature necessary to admit of satisfactory purification, by causing water to trickle down the exposed surface of the condenser.

In the slaking of the oxide of iron and the lime with which the purifying vessels are charged, water again is indispensable; giving porosity to the materials, and largely contributing to their power of absorbing the carbonic acid, sulphuretted hydrogen, and other sulphur impurities. We thus realize the vast importance of the presence of water in the various processes of gas manufacture and purification.

I need only further point to the value of the water-seal for the lids of the purifying vessels, in the hydraulic valve, in the station governor, in the gasholder tank, in the cups of telescopic holders, in the wet gas-meter, and in the water-slide pendant. The simplicity and efficiency, as well as the indispensability, of its application in these different directions is so obvious that further comment is rendered needless.

Finally, water or water vapour is one of the products of the combustion of coal gas. This product is brought about by the combination, at the point of consumption, of the oxygen in the air and the hydrogen in the gas.

In large cotton-spinning and weaving mills, this characteristic of the gas-flame is of the utmost utility. Whilst not deleterious to the health or comfort of the workpeople, it improves the quality of the work, by enabling the yarn to be spun and woven with fewer breakages than is possible in a dry, hask atmosphere. In short, this method of illumination, because of its moisture-producing quality, will always commend itself as being the most suitable and natural under such circumstances.

It will thus be seen that the presence of water, whilst objectionable under certain conditions, yet plays an important, and indeed indispensable part in the economy of a gas undertaking.

* See Journal, Vol. LII., p. 981.

Correspondence.

[*We are not responsible for the opinions expressed by Correspondents.*]

IS WATER GAS POSSIBLE FOR BRITISH GAS-WORKS?

Sir,—I have read with much interest your article entitled "Is Water Gas Possible for British Gas-Works?" as well as the reply of Mr. Bell, which appears in your last issue. I should rather infer that Mr. Bell is afraid of the possibility of the introduction of water gas into British gas-works. It is perfectly evident, from his letter, that he is destitute of one of the very initial qualifications for passing an intelligent judgment on the subject. I say this because, while he proclaims his thorough acquaintance with water gas as used for illuminating purposes in America, he is careful to add that he has "never visited America," and has therefore never seen the gas about which he talks so glibly. No doubt Mr. Bell is "the people," and "wisdom will die with him;" but it is just possible that the "opinion" of those who have visited America, and are in a certain degree familiar with facts as they exist, may be of some value even as against the *ex cathedrâ* decision of Mr. J. Ferguson Bell.

First, then, let me ask Mr. Bell whether he means to claim that, apart from the question of cost, there is any good reason why illuminating water gas, as now in practical use in America in upwards of 305 cities—one-fourth of the gas-consuming towns—should not be used in British gas-works. When I say "used," I mean used for every-day, practical consumption, in the same quantities and for the same purposes for which coal gas is now used here. I ask this question because Mr. Bell would seem to be inclined to limit its adoption to the case of "sudden fogs," and its use to a "threat to workmen that unless certain *dicta* are obeyed" their services will be dispensed with. In reply to these extraordinary suggestions, let me say that illuminating water gas, as used in America, is as superior to the present coal gas supply as sunlight is to darkness. It averages 22-candle light, as against nominal 16 candles here; it is clean, bright, and smokeless; it passes, after generation, through precisely the same processes of purification, scrubbing, &c., as are used here in connection with coal gas; and it burns from the burner in the same way as coal gas. Why, then, should its use in British gas-works be limited to "sudden fogs," or terrorizing British workmen? Does Mr. Bell fancy that some "divinity doth hedge" British gas-works, or that the public will be satisfied with the present gas when they can have something better?

Now as to the cost. In regard to this item, Mr. Bell confidently asserts that "it is not possible to distribute carburetted water gas on account of the cost of carburetting." I say, and am prepared to prove, that, by the process to which I refer, illuminating water gas of 22-candle power can be made here in England on an immense scale, at a cost not to exceed, and probably less than, the present price of coal gas per 1000 cubic feet, including all material and labour. This may surprise Mr. Bell; and he will doubtless be still more surprised when, if he will take the trouble to investigate, he discovers that nominal 16-candle coal gas costs more than 1s. in the largest gas plant in London.

This, then, is the question for Mr. Bell to consider. If pure, bright, clean, illuminating water gas of 22 candles can be distributed here in London for even the same first cost as impure, smoky, 16-candle coal gas, why should not the water gas be used in British gas-works, to the absolute exclusion of coal gas. If the British public, who have for years endured dark streets and begrimed ceilings, at 2s. 6d. per 1000 cubic feet for coal gas, can secure well-lighted highways, clean dwellings, and a pure atmosphere, by the use of illuminating water gas, even at the same price, is Mr. Bell prepared to say they ought not to have what they want? It is idle to attempt to becloud the question by talking about comparative prices paid by consumers in America, and those paid here. It is a question of cost of *production*, not a comparison of selling price. The only legitimate conclusion to be drawn from Mr. Bell's statements that Americans pay 6s. 6d. for gas and that Englishmen pay 2s. 6d., is that Americans are willing to pay a good price for a first-rate article, while Englishmen are obliged at present to pay what is here a good price for a most inferior one. I am "sanguine" enough to believe that when the eyes of the British public are opened by a practical exhibition of illuminating water gas, they will insist upon its adoption in British gas-works in lieu of the present system.

Mr. Bell rather grudgingly concedes that there may possibly be another side than his own to the question of using illuminating water gas in England, and "does not presume to prophesy" what may take place. Although I am neither a prophet nor the son of a prophet, I will venture to predict this much—that unless the coal gas companies here quickly procure a lighting process which will satisfy the public demand for a good, clean, and steady light, their days are numbered. I need only point in verification of this statement to the fact that more than 300 applications are already filed for electric lighting franchises in London and the shire towns. There must be a reason for this; and it is to be found in public dissatisfaction with the coal gas now supplied. This activity in electric lighting enterprises is the more significant in view of the high price of electric light and its well-known dangers in use, as compared with Mr. Bell's triumphant 2s. 6d.; and the willingness of the people to pay more than this sum for a better light shows that the question of cost is not so critically important as Mr. Bell fancies.

Illuminating water gas, then, which is now holding its own with electric light in America, seems to be not only a possibility but a necessity in British gas-works; that is, if British gas-works are to remain in existence, supply light, and retain customers.

I have written strongly, Sir, first because my case is strong; and, secondly, because I cannot refrain from expressing a little righteous indignation when I see so important a subject cavalierly dismissed, with a mere wave of the hand, by a gentleman who is not master of the elementary facts of the situation.

Let me say, in conclusion, that I have no doubt that Mr. Bell is open to conviction; and I trust I may soon have the pleasure of sending him an invitation to witness the manufacture of illuminating water gas at the installation at Humphrey's Hall. I am quite sure that I can then show him facts and figures which should result in his being added to the rapidly increasing list of water-gas converts—a body for whom he seems to entertain a supreme contempt.

B. Van Steenbergh.

London, Nov. 30, 1889.

Sir,—The excellent article, under the above heading, in the Journal for the 19th inst., puts the matter in a fair light, and shows that it is not only possible, but probable, that water gas, combined with carburetting with crude petroleum, may be worthy of the consideration of every gas engineer and manager in the kingdom, and that in the near future. As a gas engineer with some thirty years' experience in the design, construction, and management of gas-works in many parts of the world, you will scarcely deem it egotistical or presuming on my part to say that I fully agree with every word you have written. There are two sides to every question; and I think you have held the balance evenly.

In the majority of cases, when a man is accustomed to any particular process or manufacture, there is a preconceived, and possibly unwitting, prejudice in his mind against any innovation, especially when it comes from a source which he has hitherto regarded with a jealous eye, or considered as a rival. Both water gas and petroleum have stood somewhat in this light to the "gas man;" and I doubt not but that there are some who will strongly resent asking assistance from either water or petroleum. My somewhat cosmopolitan experience has taught me, however, to despise no material that will produce gas, if it happens to be cheap and handy; while *in extremis*, I have, on occasion, lowered the "craft" by enriching the gas with pine knots, and that proverbially scarce article, the bones of a dead donkey!

This brings me, however, to the main point, and that on which the whole question will turn—viz., £ *s. d.*—whether it will be more economical to make carburetted water gas, the ordinary coal gas (enriched with cannel in particular cases), or to manufacture coal gas primarily with the assistance of water gas and carburetting, as indicated in the latter part of your article.

The first-named system, it is easily seen, can only be adopted with economy where the whole of the produced gas made in the process could be immediately utilized in heating (or some manufacturing purpose), as it could not be carburetted with effect); while its bulk, combined with low heating power, would prevent its being worth storeage and delivery at a distance.

The second-named plan—its value and capabilities—we all know something about; but the occasional and in many cases obligatory enriching with cannel is quite another question, or may soon become so. There are very few managers of gas-works, of even the smallest size, who do not like to see a small stock of that useful article, cannel, in the corner of the coal-store, even where its use is not imperative. Some of them, however, might be surprised to learn that a few barrels of heavy oil, crude petroleum, or waste oils from petroleum distillation, would be far more effective, quicker in action, more easily manipulated, and above all more economical. The different kinds of cannel coal vary much in the quantity and quality of the gas produced, with the resulting coke generally in inverse ratio; yet all are dear as compared with oil such as can even now be obtained in the open market, while the possibilities of the future are a certainty as regards cheap crude oil. Mr. Norton H. Humphrys, when dealing with the subject of oil gas in his article on "The Chemistry of Illuminating Gas," in the Journal for Nov. 19, quotes, however, from another article that "a ton of the best cannel coal, costing (say) £2, would yield 14,000 cubic feet of gas, equal in quality to the best oil gas." Now, as the kind of cannel is not named, though the price is high, it is likely to mislead; as the fact is that the "best oil gas" has more than double the illuminating power, bulk for bulk, of what is ordinarily understood as cannel coal gas pure and simple. Mr. Humphrys goes on to quote that 140 gallons of oil would be required to produce 14,000 cubic feet of gas; which is quite correct. Therefore, oil at 7d., and not 3½d. per gallon, would be equivalent to the cannel named. As such an oil can now be obtained in Scotland at 2d. per gallon, and at any place in England or Ireland at something less than 3d. per gallon, it follows that it is a much cheaper material to use than cannel coal, at a far lower figure than that above named.

I spoke of the possibilities of the future with regard to cheap oil for gas; and liquid fuel must be included. But you have already well dealt with this point in your article. You may well say that, with oil at ¾d. per gallon, there, will be "something to figure upon." I have for some years devoted considerable attention to oil gas, and am prepared to demonstrate that, even now, at the present price of oil, in all very small works—private gas-works for mills, factories, or mansions, especially—oil gas is a much cheaper illuminant than any description of coal gas. Purer and better it cannot be desired, even by those of your readers who may consider the "cheaper" rank heresy. Mr. Humphrys states correctly: "The pure oil gas is too high in quality to be suitable for distribution in a general way;" but when he goes on to say that "attempts to distribute it at any distance are hampered by considerable condensation in the pipes, attended, of course, by depreciation in the quality of the gas," I must qualify this by saying that I produce oil gas without any such disabilities, by a very simple process, and not producing it at too low a heat. An oil gas may be made of 80-candle power, and possibly have the defect of condensation to some extent. If, however, there is given to it, as a carrier, a very small quantity of water gas, made simultaneously with the oil gas, and by a direct process, the quality may be from 60 to 65 candles, but the quantity will be greater, the total illuminating power more than that of the richer gas, and the gases perfectly permanent—so much so, indeed, that standing over water for a couple of months will not very appreciably reduce the illuminating power.

Now with regard to the third system, which you have so ably sketched—the generation of a mixture of coal gas and carburetted water gas; and, as you say with regard to cost, "it will compare favourably with anything that has hitherto been done." It is well known that the principal bye-product of a gas-works—coke—is often a drug in the market, to be got rid of as best the manager can (especially in small towns), at a price much below its real fuel value. It therefore does not require any very astute reasoning to arrive at the conclusion that, in the majority of cases, if a part of the coke were utilized as gas, and a smaller quantity sold at a higher rate, there would be economy in the change, especially when that portion devoted to gas—viz., the manufacture of water gas—gives a bye-product of incandescent producer gas (mixed carbonic oxide and nitrogen) directly applicable to the furnaces for the production of ordinary coal gas in the retorts. The "ingenious gas engineer" you refer to would doubtless be "delighted" to work out the not very difficult problem of the balance of forces and material at command, and the results to be produced, in any given case, so as to leave no waste residues—no barely saleable excess of coke, tar, &c.—while the main object, the gas itself, may be maintained at any standard desired with ease and certainty, with quantity far more under command than by the present single process. The labour difficulty (perhaps a delicate point to touch upon) would be at least reduced one-half—not entirely to the disadvantage of the stoker, and certainly to the benefit of the balance-sheet.

All this, however, depends, it may be objected, on a cheap oil for carburetting the water gas as produced; and, as an "aside," I hold that the water gas should, in whole or in part, sweep the retorts producing oil gas, which will in a great measure keep them free from any blocking of deposited carbon, which is otherwise sure to be troublesome. There is, however, a more effective plan to adopt to this end, though to explain it would extend my letter to greater length than I fear you would allow; and I therefore return to the cost of the oil. At present the commonest oil could scarcely be had at less than 2d. per gallon in any locality; but if the proposed new process—that is, new as regards our own side of the Atlantic—were merely adopted as an experiment in a few of our larger works, creating a demand for a cheap crude or residuum oil for the purpose, there need be no fear but that such demand could be fully met by some of the large oil companies who are only too ready to have the opportunity of supplying what is so plentiful in the United States, and as very shortly it will be at Batoum—not to name the dozen other localities from which oils will eventually come. Again, as to continuous supplies, there is no doubt; it is, indeed, probable that the world's supply of oil is far greater than her store of coal.

In regard to this proposed use of oil in gas-works, the question will naturally arise as to safety in transport, storeage, and manipulation generally; so that, without further occupying your space, I may say that there is now a patent, accepted at the British and foreign Patent Offices, which, applied to the transport, storeage, use, and manipulation of inflammable or vapour-giving oils, renders them nearly as safe as so much water, with the immense advantage that it entirely supersedes pumping or agitation of the oils when required to be transferred from one vessel to another at a higher or lower level. In gas-works, for instance, a tank or reservoir of oil may be entirely under ground—a mile from the works, if so required—and yet oil be drawn off in small or large quantities, as may be needed, 10, 50, or 100 feet higher than the reservoir, without pumping, and without air contact with the oil.

L. A. Scott, Mem. Soc. Eng.

Woodbridge, Nov. 25, 1889.

THE DANGER OF ELECTRIC WIRES.

Sir,—In answer to Mr. Yeaman, whose letter on the above subject appeared in your last issue, allow me to say that, after reading of the receptions accorded to Mr. Edison, both in this country and in France, not only by electricians but all other scientists, not long since, I think a non-technical reader like myself might fairly consider him not only an authority, but a very great one. But let that pass. The question in my letter was: Is there a "limited period" to the confining power of insulating material, especially as regards dangerous currents? That question Mr. Yeaman has kindly answered by admitting that there is; but "in London," he says, "the whole network will be underground; and the only danger to be feared is that to the *employés* of the supplying companies themselves. Of course," he tells us, "any fault will probably endanger the constancy of the light; but that is not, in itself, any element of personal risk."

As to the latter part of Mr. Yeaman's letter, I need only say that I fancy I had as much reason to take the statements on which my letter was based to be true, as he, or those for whom they were written, had to believe the statements made lately in some of the London papers respecting the wonders to be wrought very shortly by electricity in and out of our houses. Was there none of the "goblin" or puffed-up element in those articles?

W. M.

Nov. 28, 1889.

The Supply of Gas to the Out-Districts of Salford.—Last Tuesday an adjourned conference of the representatives of districts outside the borough of Salford, to which the Corporation supply gas, was held at Manchester, to consider what steps should be taken to secure the abolition of the extra charge made to the consumers in the various districts. At a previous meeting, it was decided to enter into communications with the Gas Committee of the Salford Corporation, and it was suggested that a conference should take place between the Committee and the representatives of the out-districts. The Committee, in reply, said they could not see what object was to be gained by the proposed conference, as it had been decided that the whole subject should be reconsidered next March. As the interval is so short, the district representatives thought it would not be worth while to take active steps at present; but they gave instructions for a statement of their claim to be prepared and submitted to an adjourned conference, to be held on Dec. 6 at the Eccles Town Hall, and if then approved to be forwarded to the Salford Gas Committee. The opinion of Counsel is that under their Act the Salford Gas Committee have no power to impose an extra charge upon consumers in the out-districts; and the authorities in those districts intend to press the point very strongly in their communication to the Committee.

Legal Intelligence.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

SATURDAY, NOV. 23.

(*Before Mr. Justice* KAY.)

BLAKER *v.* HERTS AND ESSEX WATER-WORKS COMPANY, LIMITED.

This action, which was brought by the plaintiff, as the representative of certain debenture-holders in the defendant Company, came before his Lordship by way of further consideration on minutes.

Mr. RENSHAW, Q.C., who appeared for the plaintiff, said the action was commenced by debenture-holders seeking to enforce their charges upon the undertaking of the Company. The case had been fully argued before his Lordship earlier in the year (see JOURNAL for April 23, p. 766), and judgment pronounced, declaring that the paintiff and the other holders of debentures of the Company, forming part of the issue of £6250, were entitled to a first charge on the property, and an accountant was directed to find what was due for principal and interest in respect of such debentures. The plaintiff's costs were added to their security. The Chief Clerk had found that the plaintiff and the other debenture-holders were entitled to £6706 in respect of their claim; and minutes had been prepared and agreed to between the parties, with one exception—viz., that the Company asked to have their costs paid out of the income of the undertaking.

His LORDSHIP said the minutes which had been prepared seemed to be right, with the exception mentioned by the learned Counsel. He could not possibly give costs to the mortgagor against the mortgagee out of the mortgaged estate.

FRIDAY, NOV. 22.

(*Before Mr. Justice* STIRLING.)

BRITISH WATER GAS SYNDICATE, LIMITED, *v.* NOTTINGHAM AND DERBY WATER GAS COMPANY, LIMITED.

This action, the hearing of a motion in which was reported in the JOURNAL for the 19th ult., was again before his Lordship to-day. It may be remembered that it raises the novel and important question whether the Court will interfere to restrain the shareholders of a company from proceeding to wind up the undertaking voluntarily. On the former occasion, his Lordship declined to interfere by restraining the defendant Company from passing resolutions for a voluntary winding up; it being then stated that a meeting of the shareholders was about to be held for the purpose of considering the question of liquidation. Since then the meeting had been held, and the shareholders had passed a resolution to wind up (see *ante*, p. 976); and the object of the present motion was to restrain them from passing a confirmatory resolution.

Mr. GRAHAM HASTINGS, Q.C., and Mr. SWINFEN EADY appeared for the plaintiffs; Sir HORACE DAVEY, Q.C., Mr. BUCKLEY, Q.C., and Mr. CHADWYCK HEALEY for the defendant Company and three of the Directors; and Mr. SEWARD BRYCE, Q.C., and Mr. EMDEN for the other two Directors, who were not originally defendants to the action, but had been added, and upon whom notice of the motion had been served.

Mr. GRAHAM HASTINGS said that since the matter was last before the Court (see *ante*, p. 974) the Directors of the defendant Company had been made parties to the action. It was thought that the Chairman (Mr. Goldschmidt) would make a full disclosure of the whole matter at the extraordinary general meeting; but it appeared that he had done nothing of the kind. All he stated was that the parent Company had promised to send down plant to Nottingham, and put the thing on exhibition, and that they had not fulfilled this promise; and, secondly, that the parent Company were responsible for the misstatements in the prospectus. He also stated that the patents were of little or no commercial value; but he had not condescended to give any particulars upon which he founded the statement. The case, therefore, stood very much in the same position as it did on the previous occasion. He thought it was unfortunate that two of the three Directors were not independent Directors, in the sense that they had no interest in the Company except as shareholders. The Chairman, when he took his position, accepted from a Mr. Cottam the transfer of 200 shares in the parent Company at par, although the shares were then standing at 4½ premium. The shares were sold, realizing a profit of £1070, which he still retained. His reason for taking the shares was that he thought it desirable that he should have an interest in the parent Company. If this was so, he very quickly lost his touch. Mr. Cox, the third Director, had also realized a profit of £1000 on shares. There were other dealings in the shares, some of them being bought at 5s. each. Afterwards the Directors thought it would be as well to wind up the concern; it being considered that about £2 10s. per share would be returned to the shareholders. Had the shareholders been told, when they met, that the Chairman had bought shares at this price, he did not think they would have followed him. There had been no further evidence filed by the defendants, though the plaintiffs had put in evidence supporting the allegations made by them. They had also the evidence of Mr. Samson Fox. There was plenty of evidence before the Court as to the commercial value of the patents. Upon the additional facts of the case, and looking at the injury which the plaintiffs would sustain by the confirmation of the resolution, he submitted that an injunction ought to be granted.

Sir HORACE DAVEY contended that the Court could not compel the shareholders to carry on business for a single hour longer than they wished. The majority of the shareholders had resolved that the Company should be wound up; and he knew of no power in any Act of Parliament which prevented them from doing so.

At the conclusion of the arguments, judgment was deferred.

TUESDAY, NOV. 26.

Before delivering judgment this morning,

Justice STIRLING, addressing Mr. Graham Hastings, said he had read with some care the papers in the case, and he thought there was considerable ground for suspecting that the contract for the purchase of the patent rights had been hastily and improvidently entered into on behalf of the defendant Company. Perhaps this aspect of the case ought to have occurred to him before; but if Mr. Hastings desired an opportunity of considering this question, and addressing further observations to the Court, his Lordship would be willing to postpone his judgment.

Mr. HASTINGS having thanked his Lordship, and intimated that he could not usefully add anything to what he had already put before the Court,

Justice STIRLING said this was really a renewal, in another form, of an application of which he had disposed a few days ago. At that time it was proposed to hold two meetings of shareholders of the defendant Company, with a view to passing resolutions for a voluntary winding up, and he was invited to restrain the Company from passing such resolutions. On that occasion, however, he thought he ought not to interfere. Since that time the first meeting had been held, at which a resolution for voluntary winding up had been passed; and he was now asked to restrain the passing of a confirmatory resolution. It was said that under the contract, which still remained executory, the plaintiffs were entitled to have allotted to them, in substance, one-third of the capital of the defendant Company. They said that the defendants had refused to perform this contract, and that they were further taking advantage of their breach of duty to do an act which, if the plaintiffs had their just rights, would be impossible. That was to say, they were proceeding to pass resolutions for winding up the Company, which, if the plaintiffs possessed the control over the affairs of the concern which the shares they claimed would give them, would be prevented; and it was said that irreparable damage would be caused to the plaintiffs. In answer to this, it was contended that the powers which the Directors were seeking to exercise were statutory powers with which the Court had no right to interfere. In the view which he took, it was unnecesary to express any opinion on the point of law. If, however, the Court were asked by perfectly honest shareholders to exercise its jurisdiction to restrain a dishonest act on the part of the Directors, he ventured to hope that it would be found that the Court could in such a case step in. The Court, however, ought to be careful how it interfered, and ought to be satisfied that there was an honest plaintiff seeking to restrain a dishonest course of action. In the present case there was considerable room for doubt on both these points. The contract which it was sought to enforce was provisionally entered into on the 26th of April last. It was made between the plaintiff Company of the first part, Alfred Charles Dockerell (as trustee for the defendant Company, then proposed to be formed) of the second part, and J. C. Cottam of the third part. It dealt with certain patent rights to which the plaintiff Company professed to be entitled; and by it that Company sold to the defendants the use of those rights in the counties of Nottingham and Derby. The consideration for such sale was to be £101,000—£50,000 in cash, £50,000 in fully-paid ordinary shares in the proposed Company, and £1000 in fully-paid founders' shares. The agreement also provided that J. C. Cottam was to promote the Company upon the following terms:—He was to underwrite £50,000 at least of the capital, and to form the Company. He was to be paid therefor by the vendors the sum of £25,000—half in cash and half in fully-paid shares—and to bear all expenses of promoting up to allotment, and to deposit £1000, which was to be repaid on allotment. It appeared from the statement of claim that the third plaintiff—Mr. Samson Fox—was the assignee of the benefits to which the plaintiff Cottam was entitled under the agreement. On the same day there was issued the prospectus of the defendant Company. This was headed by a repert of Sir Douglas Fox, C.E., as to "the process of water gas;" and it appeared on the face of it that the Directors were Alderman Goldschmidt, J.P., Charles James Cox, J.P., Alfred S. Kirk, John Tom M'Craith, J.P., and James G. Bellamy; and of these two were also Directors of the plaintiff Company, who were vendors. So that there were three independent Directors, two of whom were Magistrates and one an Alderman, to whom intending shareholders would naturally look for protection. On the 27th of April the Company was registered; and on the 1st of May a meeting of Directors took place, at which the contract was adopted and made binding on the Company by an agreement of that date. The depositions in this case contained some remarkable statements as to the circumstances under which the contract was adopted on behalf the defendant Company. It was a contract for the payment of £100,000 for certain patent rights. What investigation was made by the independent Directors into the value of these patent rights? Mr. Goldschmidt, in his deposition, said: "I took steps to verify the statement in the prospectus as far as I could. I went to the Leeds Forge, and took Mr. Wertenbruch, an engineer, with me. We were both satisfied with what we saw there, as far as we could see." "I relied on Mr. Samson Fox's reputation and Sir Douglas Fox's certificate, which is set out in the prospectus." "I never asked to see the report referred to in that certificate." And he further said, when he was cross-examined: "I was present at the Board meeting on the 1st of May, 1889, when the agreement of the 25th of April was adopted. I raised an objection at that meeting that it certainly ought not to be considered in such haste, but that we ought to adjourn. But Mr. Aldridge said we could not adjourn; and I voted for the resolution." Now, who was Mr. Aldridge? Mr. Samson Fox said that he was the Solicitor to the British Water Gas Syndicate. So that the Chairman said he made no investigation on behalf of the shareholders, except his visit to Leeds. It did occur to him at the meeting on the 1st of May that the contract ought not to be entered into with such haste; but the Solicitor of the vendors objected to delay, and he gave way. That was the care which this gentleman took of the interests of the shareholders. But this was not all. He further said: "I did not take active part in the formation of the Notts Company, and received no consideration whatever. Mr. Cottam offered 200 shares in the parent Company at par, so that I might be connected with both companies; and I bought the shares at that price. . . . . I do not think I had any letters from Cottam about the transfer. At the date when I acquired the shares, in April, they were at a premium of 4½. . . . . The shares were all sold together at £5 10s. or £5 9s. 6d. premium. I believe the net profit I made was about £1070. The shares were offered to me, and I thought I might take them. When I took them, I thought I might do it properly; but afterwards I came to the conclusion that it was not proper. My present view is that it was an improper transaction." In that view he (Mr. Justice Stirling) took leave to concur; and as Mr. Goldschmidt had come to this conclusion, his Lordship was spared from saying any more beyond expressing his regret that that gentleman had further trafficked in the shares of the defendant Company in a way to leave himself open to the observation that he was an interested party in the winding up. It appeared that there would probably be a sum of £2 10s. per share to be returned to the shareholders. The shares were £3 paid up; and not much of the capital had been used, and no business done. But Mr. Goldschmidt said that so recently as Oct. 19 he had bought 150 of these shares at 5s. each; so that if the winding up took place he would probably realize a large profit. The next gentleman was Mr. Charles James Cox, who was also a Magistrate. He said, in answer to the question whether he had any shares offered to him in the parent Company on becoming a Director of the defendant Company: "In the shape of a purchase at par of 200 shares. . . . Practically Cottam made the arrangement with me. The offer was his, and the assent was mine. The shares were then at about 4½ premium." This, said his Lordship, was three or four days before the floating of the defendant Company, and previous to the agreement under which this became binding on the Company. This gentleman also made a profit of £1000, more or less. His Lordship here said that he ought to mention, in justice to both Mr. Goldschmidt and Mr. Cox, that at a meeting of the shareholders they both stated what they had done. But Mr. Cox was asked whether he considered the transaction a proper one; and he replied that he did not agree with Mr. Goldschmidt's answer. His Lordship begged to state most emphatically that he (the learned Judge) did agree with Mr. Goldschmidt's answer. This gentleman, whether consciously or unconsciously, had really permitted himself to receive a bribe from

Mr. Cottam, who was promoter of the Company, having a benefit under the contract which was to be fixed upon the defendant Company. But how did Mr. Cox perform his duties of investigation? His Lordship then examined the evidence of Mr. Cox on this point, and said there was no trace of his having obtained, for the benefit of the shareholders, any independent advice as to the value of the property. The third Director was Mr. J. T. M'Craith, who stood on quite a different footing. There was no suggestion that he had received any bribe; but, looking at the statements in the prospectus, his Lordship could not think that any inquiry which Mr. M'Craith might have made could have been very effective. The title of the plaintiffs rested upon their right to specific performance of the agreement. It was needless to say that this right was not absolute. There were circumstances which might induce a Court of Equity to hold its hand, and leave the plaintiff to his rights at law. Here two of the three Directors had received a bribe from the agent of the Company, and there was evidence that the contract was hastily and improvidently entered into through its agent. It was true that this defence was not put forward by the defendant Company; it might, however, be taken by an independent liquidator. But the question was whether it was right that, at the instance of the plaintiffs, the Court should give relief, not against the present defendants, but against the shareholders, whose interest had not been represented before his Lordship. If the shareholders had resolved upon a winding up, was he to consider that this was attributable to a dishonest wish on their part? Might they not desire to wind up a Company the beginning of which was attended with so many discreditable circumstances? One of the plaintiffs was the assignee of the benefits to which Cottam was entitled under the agreement; and he could not be in any better position than his assignor. On the whole, his Lordship thought that if there was jurisdiction to interfere with a voluntary winding up, this was not a case in which it ought to be exercised. He therefore dismissed the motion; expressing the hope that, in the contests of the demerits which prevailed, honest shareholders would come by their own. To do so, they must be vigilant, and carefully consider into whose hands they would trust the liquidation.

The motion was accordingly dismissed.

THURSDAY, Nov. 28.

(*Before Mr. Justice* CHITTY.)

SPIEL'S PETROLEUM-ENGINE COMPANY, LIMITED *v.* SPIEL.

This was an action brought by the plaintiffs against the defendant under the following circumstances:—Johannes Spiel, who resided in Berlin, was the inventor of two patents for improvements in petroleum and gas engines; and in February, 1886, he sold them, and any improvements which he might thereafter make, to one Crozier. Crozier afterwards disposed of the patent rights to the plaintiff Company. The plaintiffs alleged that Johannes Spiel took out the letters patent for improvement of gas-engines under the name of Adolphe Spiel; and it was contended that this had been done with a view of defeating plaintiffs' rights. By the defence, the title of the plaintiffs was not disputed, though it was denied that letters patents for the improvements had been taken out. The defendant alleged that the patents for the improvements were taken out by Adolphe, and that they were for an entirely new construction; Johannes Spiel having acquired the right to use these improvements by purchase.

Mr. ROMER, Q.C., appeared for the plaintiffs; the defendant was not represented.

It was admitted by the defendant that the improvements in question were infringements of the patent rights of the plaintiffs; and his Lordship granted an injunction restraining him from continuing them.

WESTMINSTER POLICE COURT.—FRIDAY, Nov. 29.

(*Before Mr.* L. C. T. D'EYNCOURT.)

MARSDEN *v.* THE GASLIGHT AND COKE COMPANY.

THE RENDERING OF ACCOUNTS TO THE PUBLIC BY THE METROPOLITAN GAS COMPANIES.

This was a summons issued, at the instance of Mr. Nicholas Marsden, of 9, Paddington Green, against the Assistant-Secretary of The Gaslight and Coke Company (Mr. Reeson), for unlawfully refusing, on Nov. 23, at the offices of the Company, to sell to the complainant, on being tendered the sum of 1s., a copy of their annual statement of accounts.

Mr. HORACE AVORY represented the Company; and Mr. MARSDEN appeared in his own behalf.

Mr. AVORY said he would call his Worship's attention at once to the fact that the summons seemed to have been misconceived. The Company had an Act of 1876, under which their accounts were rendered; while the summons accused them of not having supplied an account rendered under the Gas-Works Clauses Act, 1871, which Act had no reference to the Company, so far as this matter was concerned. The complainant was informed, at the time he applied for a copy of the accounts, that they were rendered under the Company's Special Act, and that he could obtain them, as could anyone else, by applying to the Queen's printers.

Complainant said he brought the action under section 35 of the 1871 Act, which, he should contend, applied to the London Gas Companies. The Company's Special Act of 1868 incorporated the General Act of 1847 which was amended by the 1871 Act; and by the latter they were bound to supply a copy of their accounts to any applicant who tendered 1s. In support of his contention, he referred to the case of the *Dudley Gas Company v. Warmington*,* and the *Commercial Gas Company v. Scott*.† In the latter case, Justices Lush and Quain held that the 1871 Act did apply to the London Gas Companies.

Mr. AVORY said the application on the part of the complainant seemed to have been made from a want of appreciation of the rules which guided Courts of Justice in construing statutes. Probably he was not aware at the time he applied for a copy of the accounts that the Company's Special Act of 1876 provided the form in which the accounts were to be kept and rendered. He could show his Worship authority for this proposition—that a General Act did not override a Special Act relating to the same matter. Even if the General Act was subsequent to the Special Act, there was abundant authority that it would not override the provisions of the Special Act. The learned Counsel here quoted at length from "Maxwell on the Interpretation of Statutes," which authority stated that "a General Act of Parliament does not interfere with the provisions of a Special Act," and that "a later General Act does not abrogate an earlier Special Act." Maxwell was here speaking of a case in which the General Act was subsequent to the Special Act; but the present was an *a fortiori* case of the one mentioned, because The Gaslight and Coke Company's Special Act was later than the General Act. Having stated the principle, he would show that the Gas-Works Clauses Acts only applied to the defendant Company except so far as they were varied by the Special Acts—variedly, not inconsistent with. He supposed this was the point which had been overlooked here. The two decisions quoted by the complainant only established this—that the Act of 1871 did apply to a gas company which had no Special Act varying the provisions of the General Act. The Act applied to all gas companies outside the Metropolis; but it did not affect the special provisions in the Acts of his clients, or those of the South Metropolitan or Commercial Companies. In the case of the *Dudley Gas Company v. Warmington*, it was never suggested that the Company had special provisions of their own on the subject of rendering accounts, and so they were bound by the General Act to render them to the Local Authority. In the case of the *Commercial Gas Company v. Scott*, with all deference to the learned Judge who heard it, he must say that his judgment was a most ingenious one; but still it went no farther than this—to show that the Act of 1871 applied to the Company in the absence of special provisions in their own Acts. The argument of the complainant here was that because the Act of 1847 was incorporated, the amending Act of 1871 was also. The preamble of the 1847 Act recited that it was intended to comprise, in one General Act, scattered provisions which were usually contained in Special Acts of Parliament; and then it went on to state that the Act "shall extend only to such gas-works . . . . so far as the same shall be applicable to such undertakings." Section 2 of the Company's Act of 1868, incorporated various Acts, among them the 1847 Act; but the last words of the section were: "All these Acts of Parliament are, except where expressly varied by this Act, incorporated." So that both the Act of 1847 and that of 1868 clearly showed that the former was only incorporated so far as it was not "expressly varied" by the Special Act. Turning to the 1871 Act, he said that it was extremely doubtful whether it applied to the Company at all. The third section of it recited that the provisions of the Act should apply to every gas undertaking authorized by any Special Act *thereafter* passed or by any Provisional Order, "save where the said provisions are expressly varied or excepted by any such Special Act or Provisional Order." On this point he had the opinion of Lord Justice Fry that, in consequence of this provision, the 1871 Act did not apply to the Company at all. That was in the case of *The Gaslight and Coke Company v. Hardy*,* where the question raised was whether gas-stoves were liable to distress under the words of the earlier Act that gas-fittings were to be exempt from distress. The Company's 1876 Act contained provisions for the keeping and rendering of accounts; and those provisions varied those of the General Act. Supposing it were necessary to hold that there was a repeal *pro tanto* of the Act of 1871, their Special Act did it, because the preamble said: "Whereas it is expedient that the provisions of the recited Acts and other Acts relating to The Gaslight and Coke Company shall be amended, and further powers be conferred," &c. Section 57 of the 1876 Act elaborately provided the way in which the accounts should be rendered, and for the appointment of an Auditor by the Board of Trade. The Auditor had to investigate the accounts and certify them correct. Then section 59 enacted that the Auditor should from time to time prescribe the form in which the accounts should be kept. Was it consistent that if the Public Auditor appointed by the Board of Trade was to prescribe the form of accounts which the Company were to keep, they should at the same time be bound by the General Act of 1871, which prescribed a different form altogether? The General Act said the accounts were to be rendered annually; while the Company were bound to render them half yearly. Could it really be contended that they had to keep two sets of accounts?

Mr. D'EYNCOURT: It may become necessary for the Company to comply with the General Act, and make an annual statement, in addition to those required by the Public Auditor.

Mr. AVORY thought that Parliament could never have intended such a thing as that. The Act of 1871 said the accounts were to be rendered to the local authorities. Perhaps his Worship would hardly believe him when he said that the local authorities of the Metropolis had, with one accord, accepted the fact that the general statute was repealed by the Company's Special Act; and no local authority had had an account rendered to them since the passing of that Act.

Mr. D'EYNCOURT: Perhaps they have not contested the point.

Mr. AVORY said it was quite certain that if the question was worth contesting, out of the whole Metropolis there would have been someone as bold as Mr. Marsden to raise the question. The moment the accounts were laid before Parliament they became public property; and a copy could be procured from the Queen's printers for 6d.

Complainant remarked that all the arguments of the learned Counsel had been overridden by the two cases he had cited.

Mr. D'EYNCOURT: If you can get a copy of the accounts for 6d., why bring the case here?

Complainant: Because the Company have not complied with the Act.

Mr. AVORY observed that the case was really of considerable importance to the Company, because there might be other provisions in the Act of 1871 which were different to the provisions in the Special Act. If his Worship decided against the Company, they would be compelled to take the case to a higher tribunal, as the Special Act governed the manner in which their business was to be carried on.

Complainant said what he required was a copy of the accounts as submitted to the shareholders, which were not the same as those supplied to Parliament. The 1871 Act said they were to keep copies at the office, and sell them to any applicant.

Mr. D'EYNCOURT remarked that he thought complainant was fighting over a straw; and he inquired what his interest was in the matter.

Complainant replied that he was a consumer of the Company's gas.

Mr. D'EYNCOURT said he thought the complainant was fighting over nothing. Supposing his decision was against the Company, the case would be taken to a higher Court, which might decide against complainant, who, he had little doubt, would eventually have to pay the whole costs. It appeared to him that the statement of accounts which could be purchased for 6d. corresponded very nearly with what was required by schedule "B" of the 1871 Act. He was inclined to think that he should have to decide in the Company's favour. He should advise the complainant to withdraw the summons.

Complainant, after consideration, said he would withdraw it, without prejudice to applying again.

Mr. D'EYNCOURT: That is the wisest course.

THE ELECTRIC LIGHTING DEADLOCK AT NEWCASTLE.—At a meeting of the Newcastle Town Improvement Committee last Wednesday, the matter of the proposed lighting of several establishments in the city by the electric light came up for consideration. It was decided to recommend the Council to seal an agreement permitting the Electric Lighting Companies to proceed with their works pending the granting of the Licence, which has been delayed by the Board of Trade through an unforeseen legal difficulty arising (*ante*, p. 979). It was the unanimous wish of the Committee that every facility should be offered to the Companies for putting down wires without any delay. The Committee were informed that another Company was also applying for a Licence.

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* See JOURNAL, Vol. XXXVII., p. 479. † *Ibid.*, Vol. XXV., p. 889.

* See JOURNAL, Vol. XLVIII., p. 194.

Miscellaneous News.

THE MYSTERIOUS DEATHS OF WORKMEN AT THE LEEDS FORGE.

In the JOURNAL last week we briefly recorded the deaths of two men, named Tennick and French, at the works of Mr. Samson Fox, at Leeds, on the afternoon of the 20th ult., under circumstances which gave rise to the suspicion that the fatality had been caused by water gas, which, as our readers are aware, is extensively used by the Leeds Forge Company. The men, it will be remembered, were found dead in a tool-house, from which they were removed to the band-room to await the *post-mortem* examination which the Borough Coroner (Mr. J. C. Malcolm), who opened an inquiry on the subject, ordered to be made. On the following Friday morning, the medical men who were to carry out the examination proceeded to the works. The surgeon representing the Coroner was Mr. T. Scattergood, who was assisted by Mr. Hargreaves, the medical gentleman who had been called in when the men were found; and he was accompanied by his assistant, Mr. J. H. Spray. The Solicitors of the Company having obtained leave for the firm to be represented, Mr. Jessop attended the examination on their behalf; and, in addition, the relatives of the deceased men were also represented. Mr. Scattergood, jun., was present as an assistant. With the gentlemen named as the medical staff, the *post-mortem* examination was proceeded with, and had gone so far that the outward appearance of the bodies had been notified. Mr. Scattergood was about to commence the examination of the internal organs of one of the men, when his son was suddenly taken ill, and sank down unconscious. At the sight of this the other medical gentlemen at once left their work, and went to young Mr. Scattergood's aid. In their efforts, however, to attend on him several members of the party found that they, too, were becoming affected and in danger, as well as Mr. Scattergood, to whom they had made an effort to render assistance. Realizing the precarious situation in which they seemed to be placed, the surgeons made for the door, to get Mr. Scattergood out. As they were about to leave the room, another gentleman present is reported to have also become unconscious: and Mr. Spray was seriously affected. Adjoining the examination room is an office; and into it Mr. Scattergood was taken. There he had partly recovered, when he was seized with a second attack of what appeared to be convulsions. Fearing that he was in danger, the ambulance was sent for from the Infirmary. Mr. Scattergood happily recovered in a very short time, and was soon free from the effects of the attack. From what has since transpired, the symptoms of the illness were a peculiar twitching about the chest, and a swimming sensation in the head, as if the sufferer were about to faint. Seeing that the examination could not be proceeded with, Mr. Scattergood sealed up the band-room, and communicated with the Coroner. It was then arranged that a shed or tent should be put up in the yard—the Company offering every possible assistance in the carrying out of the arrangements—and that on its completion the bodies should be removed, and the examination continued on the following Sunday morning, in the presence of all the medical gentlemen. In the meantime the Coroner brought the facts of the case, as reported to him, before the Home Office, who called in for consultation Dr. Stevenson, of Guy's Hospital, with the result that this gentleman was directed to proceed to Leeds. In accordance with the above arrangement, the *post-mortem* examination was resumed on the morning of the 24th ult.; all the medical staff (with the exception of Mr. Scattergood, jun.) being present, with the Coroner and Dr. Stevenson in attendance. To prevent the repetition of so serious an incident as occurred on the previous Friday morning, every precaution that could be thought of had been taken. That the surgeons might be able to fulfil their duties under the safest circumstances possible, a tent had been erected in the yard of the works; and to this enclosure the bodies of the men were removed from the band-room, which had been kept under seal from Friday. The medical examination lasted from ten until half-past two o'clock; and was carried out in perfect safety. At its close certain parts of the viscera were taken possession of by Dr. Stevenson for analysis; the other remains being immediately coffined, to allow of interment on the following day.

Last Tuesday, the Leeds Borough Coroner resumed his inquiry, which had been adjourned to allow of the *post-mortem* examination.

Mr. WARREN, accompanied by Mr. Samson Fox, the Managing Director, appeared for the Leeds Forge Company; Mr. GREENWOOD TEALE, Solicitor, with Mr. W. L. Wildy, Engineer, attended on behalf of the British Water Gas Syndicate; Mr. H. A. CHILD represented the relatives of the deceased men; and Mr. C. MELLOR appeared for the proprietors of the medicine known as "Warner's Safe Cure," which, it was alleged, the men were in the habit of taking. Mr. RICKARD, Inspector of Factories, was also present.

The CORONER announced that he proposed to go on with the results of the *post-mortem* examination; but before any definite opinion could be given as to the real issue in the case, it would be necessary to wait until the analysis was completed. He, therefore, asked the professional gentlemen present not on this occasion to press any medical gentleman as to the actual cause of death.

Mr. *T. Scattergood*, surgeon, was the first witness. He stated that he visited the Leeds Forge Company's works on Friday, Nov. 22, accompanied by Mr. Hargreaves (who was associated with him in making the *post-mortem* examination), by Messrs. Jessop, W. H. Brown, and Loe, surgeons, who appeared on behalf of certain interested persons; and by his son, Mr. A. K. Scattergood, who was going to assist him in making the examination. There were also two assistants there—Mr. Pugh and Mr. Spray. Mr. Scattergood then read his notes of the examination of the body of French. They began: "Body well nourished, and muscular rigidity well marked. Lividity around neck, except in front, where a handkerchief was tied. Over molar bone is a separate reddish patch, on sides of trunk, all over thighs, and most markedly over posterior aspects from head to feet. The lividity is pink, unusually brilliant. Some fæcal escape *per rectum*." Mr. Pugh, an assistant, was, he said, standing with a scalpel prepared to make an incision in the chest, when, almost before it had been made, his attention was called to his son, who was leaning against a table helpless. His son was taken hold of, and laid on the ground; and it was then found that he was insensible. He had slight convulsions. A little brandy was procured, which, however, he was unable to swallow. At that time he (witness) felt some peculiar sensations, and mentioned the fact. They were a tingling in the head and legs, and a slight giddiness. On trying to stand up, he felt giddy. He felt other sensations afterwards. It was Mr. Jessop suggested that his feelings were due to natural anxiety about his son; but hardly had he said so when their attention was called to Mr. Pugh, who was becoming faint and staggering. Witness experienced a sense of constriction about the chest, and the giddy feeling remained whenever he stood up. Mr. Loe about this time complained of feeling some peculiar sensations, and a little while after he (witness) saw him on the ground. Mr. Brown said he felt peculiar sensations; and Mr. Jessop complained a little, but subsequently said it was only what he had frequently felt before. Mr. Spray also complained. Finding that they were all more or less indisposed, they had a consultation, and it was resolved to postpone the *post-mortem* examination. About that time he saw a workman coming out of the room with a light upon a stick. The man told them that he had been testing the gas pendant, and had not found any escape of gas.

The CORONER: Was anything said about a tap?

Witness said Mr. Tordoff and one or two others of the Managers were present, and they looked at a tap outside the room on the outer wall. It was found not to be completely turned off. It was arranged that it should be turned off and boxed over to prevent any one interfering with it. After deciding on Friday to postpone the examination, he went back into the room where the bodies were, and noted that there was no special odour from the chest. His impression was that all the windows were shut, because he went round the room and saw they were all fastened inside before he closed the room up. Before coming away, he collected in a bottle about an ounce of blood which had flowed from the incision on to the table. He showed the blood to Mr. Jessop, and they agreed that it was a "cherry red"—different both from the scarlet colour of arterial, and the dark colour of venous blood. He then went home, whither his son had been conveyed in the ambulance. He found him sick and faint, but quite conscious. He did not again lose consciousness, but was sick more or less for the rest of the day, and complained of a violent headache until night. The next morning he appeared quite well, and was able to do his work.

The CORONER: Did the illness cause any vomiting?

Witness said vomiting occurred at the Forge and at his house in the course of the afternoon and evening. The first occurrence of vomiting was immediately after being taken out of the band-room, he believed; but he was not present. He himself felt a feeling of constriction about the chest up to about two o'clock. It shortly afterwards left him, though he had headache in the afternoon. Mr. Arthur Scattergood was a qualified man who had had a large experience in making *post-mortem* examinations, and was not likely to be affected by an ordinary examination. He might say that he noticed, with regard to his son, that he was not prompt in approaching the body; and his son afterwards told him that he felt his knees shake, was a little dizzy, and believed he was going to faint. Witness then proceeded to read over the rough notes of the examination of the two bodies, and, in reply to questions, stated that some evidence of disease was found in both men, but it was very slight in the case of French, and not extensive in the case of Tennick. The odour from alcoholic poisoning was absent in both instances. No chemical examination was taken with respect to the cause of death. There were no external appearances to justify the conclusion that death arose from alcoholic poisoning.

By Mr. MELLOR: He could not say whether, supposing the two men had been addicted to excessive drinking, they would have been more susceptible to gas poisoning. He believed that giddiness in the head would be one of the symptoms of gas poisoning.

By Mr. WARREN: The gas-tap referred to was not connected with a gas-light, but with a supply-pipe. He understood that all the pendants had been tested by means of a light, and there was found to be no escape of gas. What took place at the first examination was likely to create anxiety in the minds of all the medical men present; and it did cause it, no doubt. The band-room was a large, airy one.

Mr. WARREN: I think you told us that you did not see the gas-burners tested, but you saw the man coming away?

Witness: The man was coming out. He had been there while I had gone to see my son.

I understood you to say that Mr. Jessop said he had frequently felt the same feeling before?—Yes. Perhaps I may be allowed to add that my son and Mr. Spray were longer in the room than anyone else, as I went down, I think with Mr. Brown and Mr. Loe, to see the cabin in which the men had been found. We were away at least ten minutes—probably nearer a quarter of an hour; and when we came back Mr. Arthur Scattergood and Mr. Spray were in the room along with Mr. Pugh, who had then joined them; so that they were there longer than any of us.

These three were nearest the bodies, were they not?—I do not say that.

To begin with, of course Mr. Pugh must necessarily have been very near, with Mr. Spray next to him, and then Mr. Arthur Scattergood?—Yes. I myself was near. Of course, the responsibility rested on me.

They were very near indeed?—Yes. I may say, perhaps, there was no odour whatever from the bodies.

Mr. Pugh and Mr. Scattergood were between the bodies?—Yes.

A JURYMAN: Is it your experience that several medical gentlemen should be so affected by any cause arising from an ordinary *post-mortem* examination?

Witness: Certainly not. I never saw such a thing in my life.

Some discussion then took place as to the medical evidence to be called.

The CORONER said that Mr. Scattergood represented the Court, and he had called him to give a full explanation of the *post-mortem* examination. This was all the medical evidence he proposed to call, except the result of the analysis by Dr. Stevenson, which would be read to the jury. He should be glad, however, to call any witnesses that were suggested.

Mr. CHILD said he intended to call Mr. Brown; his reason being that an aspersion had been made upon the deceased men that they had died from alcoholic poisoning. This aspersion had given great pain to the relatives; and he wished to negative it as strongly as he possibly could, and with as little delay as possible.

Mr. *W. H. Brown*, surgeon, was then called; and read his notes of what took place at the *post-mortem* examination. He stated that he agreed with the evidence given by Mr. Scattergood. From the appearance of the two men, he was of opinion that their deaths were not due to alcoholic poisoning.

Mr. MELLOR (to witness): I think you remember that some years ago a gas explosion took place at the Theatre Royal, and a large number of people were taken to the Infirmary, where you were then house surgeon? You were present, you say, during the seizure of Mr. Scattergood, jun., and, from what you saw and heard, were his symptoms similar to those exhibited by the people who came under your supervision at the Infirmary?

Witness: They were.

By Mr. WARREN: It was not really an explosion; but a gas-jet had been turned off on the gallery stairs, and a large number of people fell and remained jammed at the bottom of the staircase, and were brought out unconscious, and remained so for some hours. The sufferers had either been deprived of air or had breathed some noxious air; but their prolonged unconsciousness and struggling were very like what he saw the other day.

Mr. *J. S. Loe*, surgeon, deposed to getting Mr. Scattergood out of the band-room. He stated that when he (witness) had been out some little time a feeling of giddiness came over him. Somebody caught hold of him, and he laid down. He was on the ground some few minutes; and

gradually revived. He had a violent headache afterwards. He attended the resumed *post-mortem* examination, and agreed with what had been read from the notes.

In answer to Mr. WARREN, witness said he noticed that one of the windows of the band-room was open; but could not say whether there was any escape of gas or not.

Mr. *J. H. Dales*, engineer and designer to the Leeds Forge Company, was next called. He stated that he gave instructions for plans, and a model of the cabin, to be made, and he supervised the taking of the dimensions. Witness was examined at some length as to different measurements. He explained that between the corrugated iron roof and the top of the walls of the cabin there was a space for ventilating purposes equal to about 1 square foot, whilst there was also space under the door equal to 9½ square inches. The height of the seat on which Tennick was lying was 20 inches; and the height of the block of wood on which French was sitting was 16 inches. The gas bracket was 4 ft. 6 in. from the floor. There was a stove in the cabin, which stood 1 ft. 5½ in. from the floor. The cabin measured 10 feet by 6 ft. 9 in., with a cubical capacity of 540 feet. In the band-room there were in all 32 gas jets, in four groups of eight each. The two centre groups were controlled by one tap; the other two were controlled by separate taps. Witness explained that the water-gas pipes did not pass under the floor in either the cabin or the band-room. The stove used in the cabin was a water-gas stove. It was heated by a circular pipe pierced with holes, without burners. There was no chimney to the stove. The fumes went into the room.

As Mr. Warren intimated that he was not prepared to call witnesses at this stage, in consequence of having understood that only medical evidence would be adduced that day, it was decided to adjourn the inquiry until the following Tuesday (to-day).

ORIENTAL GAS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held last Wednesday, at the London Offices, 14, St. Mary Axe, E.C.—Mr. H. M'LAUCHLAN BACKLER in the chair.

The SECRETARY (Mr. A. Hersee) read the notice convening the meeting; and it was agreed to take as read the report of the Directors and the statement of accounts for the year ending June 30 last, a summary of which appeared in the JOURNAL last week, p. 1020.

The CHAIRMAN: Gentlemen, I will now proceed to make a few observations on the report. I shall not take the different items *seriatim*, because there is very little to remark upon in some of them; but there are a few which certainly require mentioning. With regard to the gas-rental, there is a slight decrease. It is not very important; but it is owing entirely to dulness of trade, which has prevailed at Calcutta as in other parts of the world, and consequently we could not help it. There has also been a great deal of competition from cheap oil, which has prevented us carrying out the extension of our business as we should have desired; and there is a reduction of receipts on account of native festivals and illuminations. These are things which are beyond our control. We cannot create festivals and illuminations for the sake of the gas consumption; consequently, when they do not naturally occur, we must suffer a slight decrease. With respect to coke, the situation is one which you would not understand merely from viewing the accounts; because it is shown on the face of them that there is a considerable reduction in the cost of the coal, and on the other hand a smaller amount has been realized for coke. It arises in this way—that the competition from inferior coke produced from dross coal, to which I called your attention last year, has continued during the whole of the year which we have under review. This has affected materially the market for our coke, although it is far superior to the other; being produced from better coal. The result has been that, instead of using coal for fuel (as we did in the previous year), we have been obliged to return to the coke, in order to keep down the stock; and consequently we have not used so much coal. In fact, we have not, with the exception of a small quantity for the heating of boilers, consumed any as fuel; but it has been used entirely for carbonizing purposes. This has helped us with regard to the disposal of our coke. We had less to sell. But notwithstanding that, we still have—or had on June 30—a considerable quantity in stock, which we have to dispose of, as well as the current make; so I suppose it is not likely we shall be able to return very soon to the use of coal as fuel. Our Manager (Mr. D. C. Niven) is quite alive to the circumstances of the times; and he has suggested to us, and we have approved of, the establishment of depôts in various parts of Calcutta; and these are beginning to operate to our benefit by aiding us to get rid of the coke which is now lying on hand, and they will probably assist us materially in the future. These depôts also have the advantage of enabling us to sell direct to the consumers; whereas if we were only to sell on the works as formerly, we should have the inferior coke brought into competition with us, and represented at the same time as gas-works coke. This is done sometimes in England; and Asiatics are not more particular than the English in this respect. I think we shall arrive at a far better state of things in the future than has prevailed during the past year. A great deal of credit is due to Mr. Niven for having suggested to the Board a way of meeting the difficulty, and one which will prove to be of material importance to the Company. With reference to tar, I find it has been in good demand during the whole of the year; and we have realized a far better price—in fact, it is the tar which has mainly pulled us through the year, because we have more than £1600 additional receipts from this source. In the past we have frequently had tar from Europe brought into competition with ours; but the value of tar has risen so considerably in Europe that there is very little chance of that being repeated at present. However, if it should be, we shall reduce our price at once, because we understand our business sufficiently well to know that this is the way to discourage any importations from Europe. We know when the tar is coming, as we see the shipping list; and the moment we find it is on the way, and is very near, we bring down our price, and the buyers and exporters are obliged to sell at a low figure. As to fittings, we have received a little less this year; but that is owing to less business being done. Respecting exchange, there is a further loss of nearly £700. This we cannot help. It is a matter which we would do our best to overcome; but it is not within our power to do it. I look with much regret on the item of exchange in the profit and loss account, compared with our capital; for I find that it absorbs 5 per cent. on the capital—that is to say, as I have explained at previous meetings, if we had not this item of exchange against us, we could pay 15 per cent. I do not say we should pay 15 per cent., because I think it would be good policy in such a case to give the consumers some benefit—a benefit from which we should derive additional consumption. Concerning public lighting, there is an increase, which, I believe, will be still greater in the current year, because we are about to light a considerable number of lamps in the suburbs which have been annexed to Calcutta, and which the Corporation have determined to light with gas. It is possible we shall also have some private consumption from that source. I hope so. It is assured to us that we shall have a large number of public lamps, which are remunerative. Although they are not always so in Europe, they are in Calcutta; and we shall perhaps, as I just said, get something from private lighting. Measures are already being taken to lay mains in the suburbs, in order that we may get the revenue as soon as possible. The Corporation are anxious for the lighting to commence; and we are equally anxious to begin as early as may be. As regards coals, I may mention that we are not in the same position as English companies, who at the present time foresee a very weighty difficulty in the great rise which has taken place recently, and is occurring daily, I may say, in the price of coal. In Calcutta we derive our supply from local mines, the coal from which is admirably suited to our purpose. The report tells you that we have secured a portion of our supply for three years; and we do not anticipate any trouble in obtaining the remainder on equally favourable terms. What we have secured is at a lower price than in the previous year. As to the Resident Committee, the Manager, and the staff generally, they have all given their best attention to promoting the welfare of the Company; and we shall propose a vote of thanks to them for the service each has rendered in his separate province. We have been deprived of the benefit of the presence of one of the members of the Committee during six months; but the business has gone on just as well as if he had been there, so I think we have no reason to complain that he took the holiday. The works, I may also mention, are in excellent order. I will now make a few observations with regard to the probability of competition. There are three things which we are liable to. The first is oil; and I believe we have already seen the worst of the competition from that in the past year. The vast quantities of oil that were sent to Calcutta no doubt have been sold there during the year for the purpose of illumination. This partly explains why we have not received more rental than appears in the accounts. I know several cities in Europe that come within my personal experience where oil has been used to a great extent in competition with gas, and where it has in fact been successful in bringing down the rental of the gas companies. But the consumers have, after a while, found that this oil is so inconvenient, so dangerous I may say in many cases, and is liable to so many accidents—spoiling furniture and doing damage in other ways, that it has been abandoned in many cases. The consequence is that, in those towns of which I am thinking at this moment, the consumption of gas has increased far beyond the point at which it was when first assailed by oil lighting. Although the circumstances are not exactly similar at Calcutta, still competition has prevailed to a somewhat smaller extent; but I have no doubt we shall find in the future that we shall get the better of the oil competition among the natives, because it is in that direction that competition exists most. Then there is water gas; but I do not think I need say anything about it, as it is not a serious competitor. With regard to the electric light, doubtless we shall have, as everywhere else, some competition from it. I am in fact sure we shall; but I do not think there is any reason to apprehend that our revenue will suffer any serious diminution from it. I am Chairman of a Company where, in one city, the electric light has obtained a great footing—perhaps a greater footing than in any city in Europe, and in that city I am pleased to be able to say that, notwithstanding the competition of the electric light, the increase of consumption of gas is larger than in the other cities lighted by the same Company. That city is one of the most important in Europe. I have no objection to mention it. It is Milan. But that is not the only place. I also know of my own knowledge other cities in Europe where similarly favourable circumstances obtain in the competition beween the two lights; so I do not think there is much to fear from that. Adverting again to the report, there are no doubt unfavourable features in it; but the reduction of the rental, and the unpropitious state of the coke market, are counterbalanced, and they leave our profits just as they were within a few pounds—such a very small sum in fact that, when I saw the accounts, I said to myself: "Why, they look almost as though they had been cooked; they are so nearly the same as last year." I can assure you, gentlemen, that is not the case; and our Auditors will tell you so. It is indeed very singular. All the unfavourable features have been counterbalanced by favourable ones on the other side; and thus we are enabled to set aside £1000 to our reserve, and pay a like dividend to that for the previous year—the amount of profit being the same. With regard to the gas-rental, this I believe will increase, owing to the extension of the suburbs which I have referred to, and the general activity which we intend to impress on our staff, and in which we shall be ably seconded by our very energetic Manager. With respect to coal, we have the three years' contract at reduced prices, and the probability—I may almost say the certainty—of getting a further supply to complete our requirements on similar terms. Regarding coke, the demand is improving, and the depôts will enable us to sell in the future much more readily. There continues a good inquiry for tar; the price keeps well up, and we have no fear of competition. As to the exchange, at the present time it is more favourable than it has been for many months past. The improvement is not very great, but I hope it is the beginning of a better condition of things; and if it be so, we may then look to turning the corner of the difficulties which have arisen out of the unfavourable state of affairs in regard to exchange. Without being too sanguine, the view I take of the future of the Company is that it is very promising; and I trust, if I am privileged to meet you again next year, I may have the pleasure of confirming that which I now merely give you as an estimate of my own. There is one other matter I desire to allude to. The decease of my colleague Mr. J. R. Peill has rendered some changes necessary. The loss of our friend was a great one to us. He was most assiduous in his duties at the Board, and ever ready to give us the benefit of his counsel, which was valuable as coming from a man of a high order of intelligence, and an engineer whose technical knowledge was brought to bear on various points of our discussions. It became necessary, on the lamented death of our colleague, to appoint at once a successor; and Mr. Garey, one of the Auditors, appeared to us to unite in himself all the qualities which are essential for a Director. He was desirous to come on the Board, and we were very glad to elect him *ad interim*. The appointment remains for your approval to-day; but this is merely a matter of form, as no one else has proposed himself. Mr. Garey, being an Auditor, vacated the position; and we had to find a successor. Mr. R. Hesketh Jones had expressed his desire to become an Auditor on the first vacancy occurring; and being an expert in gas matters, and in every way qualified for the office, we could not do better than elect him. This appointment will also come before you for confirmation. I move—"That the report and the accounts now submitted be received and adopted."

Mr. C. HILL seconded the motion, which was unanimously carried.

The CHAIRMAN proposed, and Mr. H. SOLOMON seconded, that Mr. Garey and Mr. C. Hill be re-elected to their seats at the Board.

The proposition was unanimously passed.

Mr. EASTMAN moved a resolution re-appointing as Auditors Mr. J. Blacket Gill and Mr. R. Hesketh Jones; and in doing so remarked upon the high qualifications of both gentlemen for the office.

General TUPPER seconded the resolution, which was agreed to.

The CHAIRMAN next proposed—"That a dividend of 10 per cent. for the twelve months ended the 30th of June last be declared, and that the same be paid to the shareholders (free of income-tax) on the 4th prox., less 4 per cent. paid on account on the 4th of June last."

Mr. H. L. Hammack seconded the motion, which was unanimously carried.

The Chairman moved a vote of thanks to the Calcutta Committee, to the Secretary (Mr. Hersee), the General Manager and Engineer (Mr. D. C. Niven), and the staff generally for the able way in which they carried out the directions of the Board, and conducted the business. Alluding to Mr. Niven, he said that he stood the climate remarkably well, owing to his habits being of a character which enabled him to do so better than most other people would do. He (the Chairman) had told the shareholders what the Company owed Mr. Niven. He was very energetic in trying to push the business. He had an interest in doing this, because he received payment according to the amount of gas paid for—that was to say, he received a certain amount for every million feet sold in excess of a given quantity. He (the Chairman) did not say that this would be a prime motive with Mr. Niven; but the best of them looked to their own interests. The Chairman also eulogized the services rendered to the Company by Mr. Hersee.

The motion, which was cordially agreed to, was fitly acknowledged by the Secretary on behalf of himself and the others mentioned in the resolution

The Chairman and Directors were also thanked for their services during the year; and the proceedings then terminated.

INCANDESCENT GAS-LIGHT COMPANY, LIMITED.

Proposed Reconstruction of the Company.

An Extraordinary General Meeting of this Company was held last Wednesday, at the Cannon Street Hotel, E.C.—Mr. J. Falconer in the chair—to consider the following propositions of the new Board of Directors: (1) For winding up the Company voluntarily, and appointing Mr. J. E. Denny, Chartered Accountant, liquidator; (2) for authorizing the liquidator to consent to the incorporation of a new Company, with the same title with a capital of £50,000, in £1 shares; (3) for authorizing the liquidator to sell the Company's undertaking, subject to its liabilities, to the new Company, the latter to issue "to such persons as the liquidator may direct, 39,967 shares in the new Company of £1 each, with 16s. credited as paid thereon, to the intent that each shareholder in this Company may receive one such share in the new Company for every fully-paid share in this Company registered in his name, but so that the liquidator shall not be bound to take or place any share not required and accepted by such shareholder;" (4) for authorizing the liquidator to enter into such agreements as he might think fit for carrying the foregoing resolutions into effect; and (5) "that the question be determined whether the action brought by the Company against Mr. Mactear to set aside the contracts entered into by the Company with Mr. Mactear, dated respectively July 22, 1887, and June 21, 1888, should be continued, or whether such action should be settled upon any and what terms."

The Chairman stated that since August last, when the present Directors were appointed (see *ante*, p. 263) they had deemed it their duty to consider the suggestions embodied in the report of the Committee of Investigation, especially that part of it which dealt with the financial position of the concern. On the 1st of July the Company had a cash balance of £2376, and book debts estimated at £8000. But at the date of their appointment, the cash balance was still further reduced; and the Directors found, on looking further into the books, that the debts were not likely to realize any such amount as they had been previously estimated to produce. They found the greatest difficulty in realizing the book debts; and they could not get them in fast enough to supply the necessary funds. Soon after their election, too, several outstanding claims were sent in, and immediate payment was demanded. The cash balance quickly became exhausted; and the Directors found it absolutely necessary to convene the present meeting, lay the position before the shareholders, and ask them to provide the necessary working capital to enable them to go on. The Committee of Investigation endorsed the suggestion of the former Board, that the capital of the Company should be considerably reduced; and the present Directors had thought that the best mode of carrying this suggestion into effect was to wind up the present Company voluntarily, and reconstruct it on the basis proposed, with a smaller capital. The existing liabilities were estimated by the accountant who had been called in at about £2000; the good book debts amounted to £4994; the doubtful debts to about £220; and bad debts to £1241. The weekly outgoings had been reduced by the present Board to the extent of £3000 a year; and they saw their way to making considerable further reductions. With regard to the business being done, the sales of lamps for the month of October last were 1281; and up to Nov. 23 they had been 812. The sales of "mantles" in October were 2957; while up to Nov. 23 they were 1914. These were actual sales, not including consignments for the various branches; and he considered they were very encouraging, because they had been effected without advertising or pushing the business in any way. With respect to the light, he thought no one would deny that it was a very beautiful one; and it was steadily gaining ground in public favour. But the difficulty hitherto had been that the Company had never been ready to carry out their orders. There had either been some hitch with the fluid, or with the lamps, or with the mantles. He was glad to say, however, that, with regard to the fluid, the process of manufacture had been perfected by their present chemist (Mr. M'Keen), who had done excellent service for the Company. He had found a new process of manufacturing the fluid; and the cost of production was now less, and the fluid much better, than it had ever been before. A new burner had been adopted, which was now being sent out, and was giving great satisfaction. The price of the lamp had been reduced to half its original cost; and if the Company were now put in possession of funds to extend their operations, he believed that a remunerative business might be carried on with the smaller capital proposed. With regard to the foreign patents, the Board had made arrangements with an English firm of good position to show the light in all the principal towns in Italy at that firm's own expense; and the Company supplied the lamps at the usual trade price. The Board hoped that this would lead to the sale of the Italian patent. With regard to the patent for India, very important negotiations were pending with a gentleman who was connected with all the large gas undertakings in India, for the establishment of agencies throughout the country, at his own expense, for showing the light. Under these circumstances, the shareholders would see that the Company had a fair prospect of carrying on their undertaking satisfactorily, if the reconstruction scheme was carried. The Board had very carefully considered the scheme. Before convening the meeting, they consulted some of the largest shareholders in the Company, and fully discussed the details with them; and the proposals were put forward with their approval and promised support. With regard to the action brought against Mr. Mactear to set aside the agreements entered into between the Company and him, the Solicitor would explain the present position of affairs, and it would then be for the shareholders to determine what should be done with regard thereto. Having referred to certain statements made in a circular which had been issued to the shareholders by the late Secretary (Mr. R. A. Cary), and expressed his willingness to afford any information as to the Directors' reason for confirming the action of the previous Board in removing that gentleman from his office, he concluded by proposing the first resolution.

The motion having been seconded, considerable discussion ensued relative to the question of the Directors' fees and the fact that the Board had passed a resolution on the 4th of September to the effect that the Chairman should receive £500 a year, and that the other Directors' fees should be £250. The Solicitor, however, stated that this resolution had been passed by the Directors in order to bring the remuneration back to the amount formerly paid to the Board. Eventually, the Chairman stated that if the scheme of reconstruction were passed, the Directors would accept any remuneration the shareholders pleased. This remark elicited the suggestion that the amount should be £300 a year; and this the Chairman said they would accept.

Mr. Trinder then suggested that the Chairman should separate his resolution into two parts—putting first the proposal to wind up the Company, and afterwards the name of the liquidator; because, although he and others were willing to vote for the winding up, he was not prepared to agree to the appointment of Mr. Denny as the liquidator of the Company.

The Chairman stated that Mr. Denny was called in, after the new Board were appointed, to examine the accounts of the Company.

Mr. Trinder thought it would be more in order if the Board had called in the Company's Auditors to go through the accounts.

Mr. Cary here essayed to address the meeting; but he was met with cries of "We don't want to go into squabbles between the late Secretary and the Board."

Mr. Rawson (of Messrs. Woodhouse and Rawson) said he was a large shareholder in the Company, and he thought the meeting ought to hear Mr. Cary's statement.

Mr. Cary then addressed the meeting at considerable length; stating that during his absence on leave, the Directors had discharged all the clerks, with one exception, and a number of hands from the works, and had acted in such a manner, in his opinion, as to prevent the book debts from being got in. He disputed the statement that those debts were worth only about £4000. The Directors had, he asserted, done nothing whatever to make known the merits of the new light; and they would not listen to any suggestions either from himself or those in charge of the departments. He moved an amendment, part of which he afterwards struck out, and which subsequently stood as follows:—"That this meeting be adjourned until Dec. 11, at 2 p.m., and in the meantime a Committee of Shareholders be appointed to report to the adjourned meeting upon the scheme of reconstruction proposed by the Board, assisted by the Auditors of the Company, Messrs. Price, Waterhouse, and Co."

Mr. Barr seconded the amendment.

Other shareholders addressed the meeting, and suggested that the name of the liquidator should be omitted from the resolution, and that it should stand as simply authorizing the winding up of the Company. This suggestion was acted on.

The Solicitor then, in reply to questions, stated the nature of the litigation with Mr. Mactear.

Eventually the amendment was carried; and it was afterwards decided to appoint Mr. Rawson a member of the Committee, and to leave him to nominate three other members, while the Board could appoint a fifth member, who, however, should not be one of the Directors.

A vote of thanks was then accorded to the Chairman, and the proceedings closed.

THE SALFORD GAS SCANDAL.

The "Hunter Compact"—Proposed Parliamentary Commission.

A petition to the House of Commons for a Royal Commission of Inquiry into the Salford gas frauds is being submitted to the ratepayers of Salford for signature. It narrates the whole story of the frauds, and states that in one case alone Hunter and his confederates were bribed to the extent of £2250. With respect to the proceedings of the Gas-Works Investigation Committee and the Consultative Committee, it states that they were carried on with great secrecy, but that the Town Clerk has in his possession the notes of a shorthand writer who attended the meetings. It also says, among other things, that there is good reason to believe that many of the most serious offenders have been passed over; that the public were astounded recently by an announcement that the claims against Hunter and the guilty contractors had been settled for £10,000; and that the collection of this sum is to be effected through the agency of the Corporation, who are "to institute proceedings against such of the contractors whom the convict Hunter may please to denounce, and prosecute the same with vigour until Hunter's Solicitors shall order the cessation of such proceedings." It then proceeds as follows:—"Moreover, it has since transpired that the said Committee have delegated their powers to the Town Clerk, who has been by them empowered to initiate and prosecute proceedings, or otherwise, as he alone may think fit, and to refuse to disclose to anyone the names of the parties he may proceed against, or effect a compromise with. Since the date of the compromise, two writs, if not more, have been issued with that object against firms not previously denounced—notably, one against Mr. Ellis Lever. In addition to the said £10,000, the Mayor has stated that he has received a cheque for about £430 from 'a gentleman who did not wish his name to be known,' and whom the Mayor refused to name. That the public mind has been and still is greatly agitated by the said compromise, popularly termed 'The Hunter Compact,' which has been strongly denounced by the daily newspapers and in large public meetings. The objections raised thereto are: (1) That the honour of the borough has been bartered, after a long and undignified huckstering with a convict, for a mere bagatelle compared with the extent of the frauds. (2) That innocent and upright contractors are likely to suffer very seriously by being confounded with those whose malpractices it is so studiously attempted to hush up. (3) That the compromise is a flagrant violation of the resolution of the 6th of October, 1880, which expressly orders that legal proceedings 'shall be taken against every person, without distinction, who shall in anywise be illegally concerned or interested in any contract or bargain made, or to be made, by the Corporation,' which resolution has never been rescinded or varied. (4) That as the frauds in question have been fearlessly carried on in defiance of the clauses in the contracts expressly forbidding secret or illegal payment or gift relating thereto, nothing but the fear of exposure will deter those contractors who have been in the habit of practising bribery from continuing their malpractices. That as charges of similar frauds have been made in several other and very important towns, there is reason to believe that such fraudulent transactions are widespread. Your petitioners, therefore, are strongly of opinion that, in the interest of the purity of municipal life throughout the United Kingdom, a Commission of your honourable House should inquire into the fraudulent transactions that have taken place in this borough. They are also of opinion that such inquiry would greatly strengthen the value of the sorely-needed 'Public Bodies Corrupt Practices Act, 1889 (52 & 53 Vict., cap. 69)."

BIRMINGHAM CORPORATION GAS SUPPLY.

FURTHER EXPENDITURE ON RETORTS—TRIAL OF THE COZE SYSTEM—CONCESSIONS TO WORKMEN—COST OF COAL—QUARTERLY STATISTICS.

The Birmingham Corporation Gas Committee will present, at a meeting of the Council to-day, a report dealing with various matters. In the first place they state that, to meet the increasing demand for gas, a further provision of retorts is required. The Committee have therefore authorized a capital expenditure of £2500 in the building and equipment of another section of retorts in the new house at Windsor Street, the portion of which needed for the coming winter will be completed in time to be brought into use this month. An experiment with inclined retorts, on the plan recently introduced at Rheims by M. Coze, by means of which, if the system succeeds, the labour of carbonization will be greatly reduced and simplified, has been authorized at Windsor Street, in connection with the addition to the retort power now being made at these works. In the event of the experiment proving unsuccessful, the cost of resetting the retorts on the ordinary system will be £250. The Committee report that they have for two or three years past had under consideration suggestions which they have from time to time obtained from the Engineers for reducing the working hours of those men employed in connection with the retort-house work, other than carbonizers, whose duties required them to give short attendances on Sundays, in addition to their attendance on the ordinary working days of the week. Having regard, however, to the difficulties attaching to any such arrangement in connection with the system of twelve-hour shifts, and not being prepared to recommend the Council to incur the very large addition to the annual expenditure which a general change to eight-hour shifts would involve, the Committee were unable, until early in July last, to mature a scheme which, at a comparatively small addition to the annual cost of manufacture, would have given the desired relief to the men in question. In connection with this proposed revision of the work, the Committee had also to consider memorials which they had received from the bricklayers at the different works, for a revision of the terms on which they were employed. Before they could carry out the contemplated alterations, their attention was directed to the extensive changes affecting carbonizers in the gas-works of the Metropolis, by the introduction of eight-hour shifts, whereby the work of the men was largely reduced, and employment would be found for a very considerably increased number. The Committee foresaw that these changes, combined with the generally increasing demand for labour throughout the country, would, unless the example set by the London Companies was followed, probably increase the difficulties which were experienced in the Midlands in the previous winter in obtaining the maximum number of carbonizers required. They, therefore, informed the bricklayers that it was necessary to postpone the further consideration of their memorial, as the Committee had under consideration a general revision of the hours of labour. They also instructed the Engineers to report to them fully on the effect of the changes in London, on the arrangements at other gas-works in different parts of the country where eight-hour shifts had been the rule, and generally their opinion whether the time had arrived for changes in the Birmingham works, and to what extent. They also instructed them, in the event of their regarding a general change as necessary, to revise accordingly the schemes affecting the workmen which had already received the attention of the Committee. Immediately after the vacation a report from the Engineers, recommending the adoption of eight-hour shifts in Birmingham, and setting out the alterations which the change would involve, was considered by the Committee, and the Engineers were empowered to arrange the altered terms with a deputation from the men. After the Committee had received and approved the report of the Engineers, recommending the change, they received a memorial from the carbonizers, through the Secretary of the Amalgamated Society of Gas Workers, asking that the change to eight-hour shifts should be made, and informed him, in reply, of what had already been done in the matter. Subsequently, and as the result of several interviews between the Engineers and the deputation from the workmen, the details of the scheme were arranged, submitted to the Committee, and approved by them, and the changes were carried out on Oct. 17. The additional cost of these changes, which will increase annually with an increased consumption of gas, is estimated on the present consumption at £14,000 per annum. The Committee report that they have made contracts for the coal which will be required at the works in the year ending June 30, 1890. The additional cost of coal over that of last year, arising out of the advanced prices, will be about £26,000, to which must be added something like £11,000, or 7d. per ton, additional railway rates. The latter item represents rebates hitherto allowed on the transmission of large quantities of coal to gas undertakings, which have been withdrawn by the railway companies, on the plea that such rebates are forbidden under the Railway and Canal Traffic Act, 1888. Contracts have also been made for the same period for the lime and oxide of iron required for purification. Contracts for the iron pipes and iron tubes and fittings required to Dec. 31, 1890, have also been made. Arrangements have been completed with the Solihull Rural Sanitary Authority for the transfer to them of the public lamps and the control of the public lighting within the parish of Yardley, the gas to be charged on the reduced terms offered to local authorities who undertake this duty. The whole of the public lamps within the area of supply, except those within the districts of the Harborne and Saltley Local Boards, are now under the control of the local authorities in whose districts the lamps are placed. Having regard to the advance in the price of coal, and to the increased demand for coke from the South Staffordshire district, the price of that residual was advanced by 1s. 6d. per ton from July 1 last. The customary statistics for the quarters ended June 30 and Sept. 30, as compared with the corresponding quarters of the previous year, are appended to the report. In the Midsummer quarter, the sale of gas was 634,412,600 cubic feet, as compared with 618,980,900 feet in 1888—an increase of 2½ per cent. In the Michaelmas quarter, the sale of gas was 549,470,900 cubic feet, as compared with 535,018,200 feet—an increase of 2¾ per cent.

ELECTRIC LIGHTING FOR ST. HELENS.—A special meeting of the St. Helens Town Council was held yesterday to take into consideration and determine upon the expediency of applying to the Board of Trade for a Provisional Order to authorize the Corporation to supply electricity for public and private purposes within the present limits of the gas supply. Alderman Cook, Chairman of the Gas Committee, explained that some few months ago the Corporation had notice from two electric lighting companies that it was their intention to apply for Licences to supply electricity within the borough for public and private purposes. It was obvious that inasmuch as the Corporation possessed the gas-works, and had practically a monopoly of the public and private lighting of the town, it would be very inexpedient for an electric lighting company to enter into the town and supply electricity in competition with gas. The installation would cost £20,000; but before they committed themselves, they must be satisfied that they could find sufficient customers. He moved that application be made for an Order. Alderman Gamble seconded the motion, which was carried.

GAS WORKMEN AND THE LABOUR QUESTION.

Last Sunday week, a large meeting of the men in the employ of the South Metropolitan Gas Company, was held at Deptford, to discuss the proposed scheme of bonus. The General Secretary of the National Union of Gas Workmen (Mr. W. Thorne) urged all the men not to sign the agreement put forward by the Directors, as it required those signing it to work for twelve months in any capacity at any of the stations of the Company at the current rate of wages. If the men stood by the Union, they would get a bonus without waiting a year, and having to abide by terms which were nine points to one in the Company's favour. He considered the scheme was meant to upset the Union; but the intention would be frustrated, as the gas workers were going to affiliate with the coal porters, and, by thus combining, hold the coaling and lighting of London in their own hands. Mr. Livesey's scheme had been tried at other places, and had failed. After some discussion, it was unanimously resolved that no member of the Union should sign the agreement.

The dispute between the stokers employed at the Manchester Corporation Gas-Works reached an acute stage last week. It will be remembered that the men objected to work with non-Unionists; and as the Gas Committee of the Corporation not only refused to discharge these men, but publicly announced that they should have protection in the performance of their duties, the disaffected ones sent in a fortnight's notice as from the 21st ult. At the meeting of the Committee on Monday last week, it was resolved to post the following notice at each of the works:—"The Gas Committee hereby intimate to those workmen in their employment who have given notice to terminate their engagements in 14 days, that unless such notices are withdrawn on or before Friday, the 29th inst., steps will be taken to supply their places." Also to post placards about the city, giving particulars of the dispute and of the action of all the parties thereto. In these the Committee expressed their anxiety to make known that all the previous demands of the men for shorter hours, less work, and increased wages were granted on the 1st ult.; the statement of terms being signed by representatives of the men on behalf of themselves and their colleagues. The Committee pointed out to the citizens and gas consumers generally that the step since taken by the men was an attempt to interfere with the freedom of action of their fellow-workmen, and, if persisted in, would cause considerable loss and inconvenience to the public. They therefore claimed the support of all right-minded men in this crisis, and appealed to the gas consumers to use the gas as economically as possible, and to make some temporary provision for lighting their premises, as it was probable that the usual supply would have to be curtailed. A meeting of the General Purposes Committee was held on the following day, under the presidency of the Mayor (Mr. Alderman Mark), to consider the action of the Gas Committee in connection with the dispute. A report of the Committee's proceedings having been read by the Deputy Town Clerk, the Mayor expressed entire approval of their conduct. Mr. Alderman Lamb, as Chairman of the Committee, explained that, in response to petitions from the men, a number of important concessions had been made, with the result that the men seemed to be satisfied. They were getting along very nicely, and he was thankful to say were doing almost without Sunday labour. Within the past few days, however, they had had another demand from the men, of such a cruel and tyrannical nature that the Committee felt that it ought not to be complied with. This demand was, in effect, that the Committee must turn off every workman who would not submit to be a member of the National Union of Gas Workers. In reply to it, the Committee unanimously ordered that a placard should be issued announcing that every man who faithfully did his duty should have perfect freedom to continue his employment, and be protected in the discharge of his duties. The Committee thought it would be an outrageous proceeding to coerce men in their employ to join the Union. They had never taken any action with regard to clubs and unions, and, so far as he knew, did not intend to do so. Alderman Sir John Harwood, Deputy-Chairman of the Committee, said the concessions to which Alderman Lamb had referred had not been granted in any niggardly spirit. They meant that every shopkeeper who paid on £100 a year would have to pay this year at least 16s. 8d. more, or 2l. in the pound additional upon his rates. The Committee had not only to look to the labourer, but to the tradesmen as well, because the money required to meet these concessions—which he estimated at £18,000 per annum—would have been applied in the remission of general taxation. The Committee were prepared to stand by what they had done; but, having imposed additional charges upon the ratepayers to meet the demands of the gas workers, he thought it would be wise on the part of those who counselled them, to persuade them not to strike for a more sentimental idea. The Mayor moved a resolution heartily endorsing and approving of the action of the Gas Committee; and Mr. Alderman Batty seconded it. Mr. S. Chester-Thompson said that on former occasions he had done his best in support of the demands of the workmen; but he had no sympathy with them in this case. A more cruel, wretched, and tyrannical demand he had never heard of. The resolution was then put, and carried. Upwards of 50 members of the Council were present, and the whole of them voted for the resolution except two members, who refrained from expressing their opinions either way. A mass meeting of the men was held on Sunday, the 24th ult., at which they were advised to pay no attention to the Gas Committee's placards, but to insist on their demands being granted. This course has been followed in the main, as up to last Friday night only a few men had withdrawn their notices. The Gas Committee will, therefore, be compelled to carry out the course determined upon at the meeting of the General Purposes Committee, and take steps to fill up the places of the men who have resigned, immediately the 14 days' notice has expired. The Gas Committee have, we understand, already a large number of men who are ready to commence work at the different stations, and numerous applications for employment have been received. Policemen were on duty at the works, to prevent disturbances, last Friday; but everything passed off quietly.

In the neighbouring borough of Salford the gas stokers are in sympathy with their fellows in Manchester; and, although they have no "grievance," they have, as already reported, given notice of their intention to leave their employment next Friday in the event of the difficulty in Manchester resulting in a strike. At the meeting of the General Purposes Committee of the Salford Corporation on Monday last week, the subject was discussed at some length; and eventually a resolution was passed in favour of intimating to the men that unless their notices were withdrawn within seven days they would have to leave the works, and other men would be procured to take their places. The Gas Committee subsequently issued explanatory placards, similar in terms to those posted about the city by the Manchester Corporation. Up to last Friday, not a single withdrawal had come to hand; and accordingly the men have forfeited their situations, and will have to leave the employment of the Corporation on Friday next—the day on which their fortnight's notices expire. The strike, so far as Salford is concerned, will affect nearly 300 men out of the 422 employed in the gas-works. The Gas Committee last Saturday issued the following notice:—"The Gas Committee desire to inform the gas consumers and the public that as the men employed at

the gas-works have not taken the opportunity offered by the Committee of withdrawing their notices, it is inevitable that the supply of gas will be interrupted. The Committee advise that provision should be made at once by the consumers to meet the probable deficiency. The Committee also desire to inform the public that, as no grievance is alleged by the Salford men, and no demand made, there is consequently nothing which the Committee can do to remove or avoid the present difficulty, except to take all steps possible to replace the workmen. Meanwhile the Committee ask for the forbearance of the public until the difficulty is surmounted, and that the greatest economy be observed in the consumption of gas. The Committee wish to give notice that the supply of gas will be discontinued on and after Monday, Dec. 2, from midnight to 5.45 a.m., and from 8 a.m. to 4 p.m. daily, until further notice."

Last Friday week, a deputation of the stokers employed by the Barnsley Gas Company, who, as already stated, have asked for an advance of wages, met the Directors—Mr. E. G. Lancaster presiding—for the purpose of discussing the matter. The men asked for a reduction of four hours per shift, and an advance of wages—stokers from 5s. 3d. to 5s. 6d. per shift; firemen, 5s. per shift; and wheelers, 4s. per shift. The Chairman pointed out that altogether the men's demands on the Company would amount to upwards of £1400 per year; and he did not think they had looked at the matter in this light. It would require an increase of 4d. per 1000 cubic feet in the price of gas to make up the sum which they asked the Directors to lay out; and the public would not stand such an advance. The men, on their part, pointed out that they work longer hours than other gas stokers, and did other work. The advance they were asking for was not so high as had been granted in other places; and they thought their demands were not unreasonable. The Chairman said if they asked for 10 per cent. the Board would be willing to give them that. The deputation thanked the Directors, and retired. The men having considered the Directors' proposals, another interview took place last Friday. An immediate advance of 10 per cent. was offered, and a second 10 per cent. on the 1st prox., when the coal miners' advance takes place; this to be binding on both sides until May 1 next. The men accepted the proposal; and passed a hearty vote of thanks to the Directors and the Secretary and Manager (Mr. John Hutchinson), and the Assistant-Manager and Secretary (Mr. W. W. Hutchinson), for their courtesy and kind consideration.

Under the auspices of the Amalgamated Society of Gas Workers, Brickmakers, and General Labourers, a breakfast was held last Sunday week in the Birmingham Town Hall to mark the efforts which have recently been made for the improvement of the condition of the gas workers of the city, and to celebrate the concession of eight hours' work and other advantages which have accrued to the men. About 1300 workmen and their wives and female friends partook of breakfast in the basement of the hall; and there were present representatives from Wolverhampton, West Bromwich, Walsall, Coventry, Dudley, and other places. About 700 of the number were from the Corporation gas-works at Saltley and Windsor Street. Afterwards a meeting was held in the hall, at which addresses were delivered by prominent supporters of Trades' Unions. Mr. Eli Pain (President of the Society) occupied the chair; and among those upon the platform were several members of the Town Council whose names are associated with the labour movement. Mr. W. F. Beeton, the Secretary of the Society, read several letters of apology for absence. Alderman Pollock (Chairman of the Gas Committee) wrote that whilst regretting that he could not be present, he saw with pleasure that the celebration was an expression of the satisfaction the *employés* of the Gas Department felt at the alterations which had recently been effected in the hours of attendance and in the re-organization of the work. In making the concession, the Gas Committee had assumed a great responsibility. They believed, however, that the Council at their next meeting* would approve their action, and consider that the steps taken would be no less satisfactory to the ratepayers than in the interests of the gas workers, who would, he felt sure, be anxious to support the Engineers and the Committee in the successful working of the establishments entrusted to them. Mr. Henry Hack (Engineer at the Saltley works) wrote that he should like to bear testimony to the friendly and business-like way in which the representatives of the men discussed with the Engineers the various alterations in the work involved by the change from twelve to eight hour shifts. The men could not, he said, have had better champions of their cause. He sincerely hoped that the improved relations between the employers and the employed which were said to have accompanied the inauguration of the new system might long continue, and that as years rolled on mutual consideration and kind feeling might increase. Mr. Charles Hunt (Engineer of the Windsor Street works) wrote that he hoped the eight-hour movement would prove a real benefit to the men; and he looked with equal confidence to its effect upon the interests of the employers. The Chairman having opened the meeting with a few remarks, Mr. Bloor expressed the gratitude of the workmen for the concessions which had been made. Mr. R. Toller moved—"That this meeting desires to express its great satisfaction with the improvements made in the position of the gas workers of the district by the alterations recently introduced—a satisfaction that is increased by the knowledge that, owing to the conciliatory manner in which the men have been met by the employers, they have been brought about without resort in any single instance to any arbitrary conduct." Mr. Frost (Saltley) seconded the motion, and it was carried unanimously. A vote of thanks was then accorded to the visitors and to all the gas stokers' friends for their assistance in the movement, and the proceedings closed.

Reference was made in the JOURNAL last week to the movement on the part of the stokers at Keighley. The principal grievance was in regard to Sunday labour, which, under existing arrangements, is performed to a slight extent. But it seems that when the eight-hour system was adopted a short time since, the men actually expressed a wish to work on that day in preference to stopping. After much discussion and newspaper correspondence between the Gas Manager (Mr. J. Laycock) and Mr. J. Bartley, a representative of the Gas Workers' Union, the differences have been in a great measure amicably settled. Mr. Laycock has had an interview with the men; and the terms of settlement have been decided upon. We understand that it is the intention of the Gas Committee to discontinue Sunday labour as soon as possible; and in the meantime the men will be paid time-and-a-half for such work. Double time will be paid for Christmas Day and Good Friday; but this had really existed before, as some of the men have received a day's holiday, and have been paid for it. The stokers will receive 5s. per shift of eight hours, and have a week's holiday every year, and be paid for it. The firemen will be paid 4s. per day; but they have agreed to abandon their request for eight-hour shifts. The Committee intended to grant these terms on their own initiative, after similar terms had been agreed upon at Shipley and Leeds; and we learn that the men have expressed their regret for not approaching the Gas Manager direct before joining the Union.

* An abstract of the Gas Committee's report, in which this matter is dealt with (to be presented to the Council to-day), is given in another column.—ED. J.G.L.

Last Thursday, a deputation of the carbonizers of the Rotherham Corporation Gas-Works attended the meeting of the Gas Committee to lay before the members their demands for higher wages and shorter hours. Alderman Wragg was in the chair, and there was a fair gathering of Councillors. The deputation placed their views before the Committee, and in the end their demands were practically granted, with the exception that 1s. 6d. per week for good-time money, and one week's holiday per annum for permanent men, with pay therefor, was refused. The terms upon which the stokers, engine-men, and general labourers are to be engaged are as follows:—Stokers to work eight hours per shift, draw and charge 28 retorts per shift, with coal and fires to be taken off, and no scurfing to be done by stokers. Wages, 5s. per shift; Sunday work, time-and-a-half, from 6 a.m. to 6 p.m.; Christmas Day and Good Friday, double time. Three engine-men are to be employed instead of two; and the hours reduced to 56 per week; time-and-a-half for Sunday work; double time for Christmas Day and Good Friday. General labourers to work 54 hours per week, as now; time-and-a-quarter for overtime; time-and-a-half for Sunday work; double time for Christmas Day and Good Friday; with 2s. per week advance. All men to be subject to seven days' notice on either side.

The stokers in the employ of the Mossley Corporation have been granted an increase of 6d. per day; the hours to be reduced from twelve to eight; and the men to be paid time-and-a-half for Sunday, and double time for Christmas Day, Good Friday, and Whitsunday. The yard-men and general workers have had their wages advanced 10 per cent., and the hours of labour reduced five per week. The Ashton-under-Lyne stokers' wages have been advanced to 5s. per day of eight hours; with double time for Christmas Day and Good Friday. The day men receive an advance of 2s. per week. Mr. David Clarke, the Manager of the works, estimated that the concessions mean practically an addition of 1d. per 1000 cubic feet to the cost of gas production. In the neighbouring borough of Stalybridge, the negotiations have taken a less favourable turn. The Gas Committee flatly refuse to comply with some of the demands made upon them, and there is at the time of writing every prospect of a strike. The men's notices were handed in last Thursday, and will expire on Thursday or Friday of this week. It is stated to be impracticable to adopt the eight-hour system at these works; besides which the Committee have set their faces against the advance of the labourers' wages. The Directors of the Derby Gas Company have granted the following advances to the men:—(1) To the stokers, from 4s. 6d. to 5s. per shift of eight hours; (2) 30 retorts, of 2 cwt. of coal per retort per man, with no fires or extra work; (3) firemen, 5s. per day of eight hours. Yard-men from 19s. to 20s. per week of 54 instead of 60 hours. Engine-men, from 4s. 6d. to 5s. per day; and engine firemen from 3s. 8d. to 4s. per day. Time-and-a-half for all Sunday work from 12 midnight to 12 midnight; and time-and-a-half for Christmas Day and Good Friday. The Hyde Gas Company have settled with the men without conceding the eight hours' demand. The stokers are to have an advance of 6d. per day, with time-and-a-half for Christmas Day and Good Friday. The rate of wages is now 5s. 6d. per day of twelve hours, seven days a week. At Dukinfield there is reason for believing that the demand will not be pressed. Amongst other towns where the question has been raised may be mentioned Shipley, Littleborough, Ramsbottom, Haslingden, Colne, and Padiham, and it is said to be probable that the price paid at Nelson will form the basis of the wages paid in these places. The Nelson gas stokers receive 4s. 6d. per day of eight hours, and are expected to carbonize 2 tons 8 cwt. in that time. On Sundays the men receive 5s.; making the week's wages 32s. Double wages will be paid on Christmas Day. This arrangement has been made by the Gas Manager (Mr. W. Foster); and the Gas Committee last Thursday night confirmed the arrangement. The difficulty has also been arranged at Blackburn. The Brighouse Local Board had an application for an advance made by their stokers under consideration last Friday evening. It was decided that the wages of the stokers be increased to 5s. per shift of twelve hours, the work and labour to be as at present; or, when thought desirable by the Gas and Water Committee to change the method of working, each stoker will be required to draw and charge twelve retorts, and look after two fires for 5s. per shift of twelve hours; coal and coke wheelers being provided for them for the alteration in the work.

THE WATER-WORKS SCHEME AT POCKLINGTON.—At a meeting of the Directors of the Pocklington Water Company, Limited, last Thursday, the Secretary reported that more than the required share capital had been applied for—a considerable portion being taken up by the inhabitants. The tenders for laying main-pipes, &c., were opened, and that of Mr. T. Bell, of Market Weighton, was accepted, and the work was ordered to be commenced forthwith. The Engineers (Messrs. Fairbanks and Son, of Driffield and Westminster) were directed to prepare plans for the remaining contracts. The scheme is a gravitation one.

REFUSING TO SUPPLY GAS.—At the Cardiff Police Court, last Wednesday, Mr. J. H. Jones made an application, on behalf of Mr. A. C. Willans, of the New Sea Lock Hotel, for a summons against the Cardiff Gas Company, for refusing to supply gas on the 25th and 26th ult. Mr. Jones said that Mr. Willans had offered a deposit or guarantee, but this had been refused on the ground that he was in arrear in respect of the Ship and Pilot Inn, which he had recently left. Mr. Jones contended that the Company had no right to take such action, under their own bye-laws. The summons was granted. Later on, however, the Secretary of the Company (Mr. Clarry) attended, and gave a written undertaking to supply the gas on the name of Mr. Willans being withdrawn, and the owners of the premises becoming the applicants for the supply. The summons was thereupon withdrawn.

THE MANAGEMENT OF THE STOKE-UPON-TRENT CORPORATION GAS UNDERTAKING.—A meeting of ratepayers was held at Stoke-upon-Trent last Tuesday, to protest against the system under which the business of the Gas Department is conducted. It was stated by Mr. T. Smith that the undertaking was managed by a small Committee who did not report to, and were not under the control of the Council; and he moved a resolution recommending that the Committee having the management of the gas-works should be placed on the same footing as other Committees, and that all municipal matters should be subject to the general supervision of the Council. Mr. Alderman Leason (Chairman of the Committee) gave a history of the gas undertaking; and said the Stoke Gas-Works had been conducted very much more for the benefit, interest, and well-being of the borough than the gas-works of neighbouring towns under similar circumstances and conditions. Since the works became the property of the Corporation, in 1879, the Gas Committee had handed over towards the reduction of the rates £32,526. He contended that the works had been efficiently managed in the past; and he asked the meeting not, for the sake of the mere sentiment and whim of some people, to incur the risk of loss by adopting a new system. Mr. F. Griffiths said Alderman Leason had missed the point, which was that the day had gone by for a small Committee to have uncontrolled management of the affairs, or a portion of the affairs, of the town. The motion was carried by a large majority.

GAS ENTERPRISE IN THE COLONIES.

Opening of the Bairnsdale (Gippsland) Gas-Works.

The gas-works which have been erected at Bairnsdale (Gippsland) by Messrs. J. Coates and Co., of London and Melbourne, were opened on Saturday, Aug. 31, in the presence of a number of the residents. An inspection of the works having been made, the party partook of refreshment in the retort-house, and Mr. Coates gave some particulars as to the undertaking. He said the retorts (of which there are four fire-clay and three iron) were capable of producing from 30,000 to 40,000 cubic feet of gas per day; and the gasholder had a capacity of 30,000 cubic feet. This was very ample provision for the requirements of the town; but it had been made because it was believed that Bairnsdale was destined to become a large and important place. The Company laid the services without cost, and also supplied the meters rent free. All the consumers had to do was to pay for the services inside their houses. The Company would have some gas-stoves which could be had on hire, as was done in Melbourne, at 2s. 6d. and 3s. 6d. per month, or be purchased outright if consumers preferred it. The coal they used in the works came from Newcastle, New South Wales; but the Company hoped the day was not far distant when Gippsland coal would be available for gas making. The cost by rail was 35s. per ton; and this was the reason the gas was charged at the rate of 12s. 6d. per 1000 cubic feet. Even at this figure, however, it was lower than in other places. He thought the residents of Bairnsdale would admit that they had been most fairly dealt with. As the consumption became greater, so would the price be reduced. He then proceeded to explain the process of gas making; and concluded by remarking that, with the consumers supplied and those arranged for, they expected shortly to number 200. To show the progress of gas lighting, he remarked that the works just completed were the twentieth erected by his firm in the colonies in the course of three years. The gas was then turned on by Mr. Drevermann, J.P., who proposed success to the undertaking—a toast which was most enthusiastically received. The works will be under the management of Mr. Dunderdale.

THE PURCHASE OF THE RASTRICK WATER WORKS BY THE LOCAL BOARD.

Last Tuesday, Mr. Arnold Taylor held an inquiry at Rastrick respecting an application of the Local Board for sanction to borrow £16,500 for the purchase of the undertaking of the Rastrick Water Company, and for the payment of the expenses of the Board's opposition to the Rastrick Water Act of this year. Mr. S. Wright appeared in support of the application; and stated that the sum which the Board would require for the purchase of the undertaking was £15,250, and the remaining £1250 would cover the cost of the Board's opposition to the Company's Act, and also the charges incidental to the transfer of the undertaking. The Company was formed in 1868; and, on an average, paid a dividend of about 8 per cent. In their Bill, the Company asked for power to borrow £9000, which was granted. The Board thought the opportunity a favourable one for acquiring possession of the undertaking, and a clause was inserted in the Bill by which the promoters agreed to sell and the Board to purchase for the sum of £15,250. The Company began with a capital of £6000; there were certain charges to be capitalized to the amount of £1250; and the statutory rights which the Company had obtained cost probably not far short of £3000. Taking the items in the last balance-sheet which were available as profit, he found that they amounted to £960, or a little more. This would be applied to the redemption of the loan asked for, which the Board desired should be granted for a period of forty years, or at least thirty years. The Board expected to obtain loans at the rate of 3½ per cent.; and they thought they would then be able to acquire the works without any further charge upon the ratepayers than the cost of the water. Mr. Charles Gott, C.E., described the Company's works. There was a service reservoir of 300,000 gallons capacity, eleven miles of mains of from 3 inches to 6 inches diameter, foreman's house, offices, meters, &c. The Company had power to construct another reservoir of 4 million gallons capacity for storeage purposes. An agreement with the Halifax Corporation conceded to the Company two important rights—first, that the Corporation should supply the district at 5d. per 1000 gallons, whereas the charge to other townships was 9d.; and secondly, the Corporation gave up their absolute right to supply the district, at the same time giving them the liberty to take water from local sources, and so reduce the quantity of water they should take from the Corporation. He thought the price agreed upon by the Board to pay the Company was reasonable, considering the altered circumstances of the case. He had always been of opinion that water supplies should be under the control of local authorities; and this principle had been recognized by Parliament. Mr. Learoyd opposed the application on behalf of a number of ratepayers who considered the bargain was not a provident one. The price, he argued, was altogether out of proportion to any advantage that the ratepayers would derive from the transfer of the undertaking to the Board. The Board, he considered, had decided to pay the price in order to save themselves from defeat. Mr. Clay, a shareholder in the Company, was called in opposition to the application. He said he had been Auditor to the Company for some years. Last year was more profitable than any year since the formation of the concern. The profit was £897; while in 1887 it was £716; in 1886, £396; in 1885, £464; and in 1881, £123. The £16,000 proposed to be borrowed on the water-works would add a serious burden to the ratepayers; but it would not end there, as further borrowing powers would have to be obtained to put the works in a satisfactory condition. Further evidence having been given, Mr. Wright replied to the arguments which had been advanced in opposition to the application, and pointed out that whereas the Company now received 7 and 10 per cent. in dividend, the ratepayers would have to pay only 3½ per cent. for the borrowed money. A vote of thanks was passed to the Inspector; and the inquiry then terminated.

Newhaven and Seaford Water Company.—The eighth ordinary general meeting of this Company was held last Tuesday—Mr. J. Farncombe in the chair. In their report, the Directors stated that the revenue account showed a profit for the year ending Sept. 29 last of £560; and that the balance available for dividend, as shown in the profit and loss account, was £482. They recommended that a dividend at the rate of 3½ per cent. per annum, free of income-tax, should be declared, amounting to £420; leaving a balance of £62 16s. 2d. to be carried forward. The supply of water continued satisfactory. The Chairman, in moving the adoption of the report, remarked that the proprietors had the satisfaction of learning that they had a smaller amount of expense and a very considerably larger revenue; he thought all must agree that this was a very gratifying position. Everything was in fair working order. He had no doubt that as time went on the Company would progress, and the dividends increase. Mr. Every seconded the motion, and it was carried; and the dividend recommended was subsequently declared.

NOTES FROM SCOTLAND.

(FROM OUR EDINBURGH CORRESPONDENT.)

Edinburgh, *Saturday*.

The Edinburgh and Leith Gas Commission held its first meeting after the election of new members on Monday. Several of the new members, and notably Mr. G. Auldjo Jamieson, who is notoriously "in love" with electric lighting, did not attend. There were two items of interest before the Commission—one the statistics by the Engineers, which show a substantial increase of business, and the other a conversation upon the quality of the gas. The Engineers' reports stated that the output from the Edinburgh works during October was 83,931,000 cubic feet, an increase of 4,126,000 cubic feet upon the output for October, 1888; and that from the Leith works the output was 42,364,000, an increase of 3,632,000 cubic feet. While in Edinburgh 8631 tons were carbonized, as compared with 8085 tons in October last year; the cost was £4922 8s. 5d., as compared with £5649 16s. 1d. In Leith 4046 tons were carbonized, as against 3931 tons in October of last year; and the costs were £2381 6s. 4d. and £2049 17s. 2d. respectively. In Edinburgh this year there were 352 retorts working, as compared with 311 in October of last year; and in Leith there were 137, as compared with 139. The question of the quality of the gas was introduced by Bailie Turnbull, who, as is usually the case, proceeded, not upon what he had observed himself, but upon the "great many complaints which he had heard from the west and south-west districts of the city" about the quality or pressure of the gas. Mr. Mitchell, of the Edinburgh works, gave a satisfactory explanation with reference to those districts, in the statement that for some time back he had been trying to improve the supply in that district by extending the 12-inch main for about 1300 yards. He could quite understand why people, such as Treasurer Clapperton, should complain, because it was utterly impossible that while these operations were going on they could get a sufficient supply. Bailie Walcot said he had noticed lately that the quality of the gas was reported to be very high—32 candles in Leith, and 31 in Edinburgh—and he asked if they were not going far beyond their standard? Mr. Linton, of the Leith works, replied that they had had a great struggle to get coals, owing to irregularities caused by the miners' agitation, and they could not always get the exact mixture they would like. There had, however, been nothing, on an average, like the quality stated—their average was about 29 candles; and the instruction of the Commissioners was to make gas of from 23 to 28 candle power. Of course, they must make it to read a little higher at the works to insure that it should be of that standard in the town. Mr. Mitchell said it was perfectly impossible to get two Analysts to agree. Treasurer Clapperton stated that the complaints were almost universal; and what he would like was that some explanation should reach the public. He complained of it in the Town Council, because in his district they had to burn a great many more lights. Provost Aitken, of Leith, said that under their Act of Parliament, two testing-stations were provided; and Mr. Linton added that the Gas Commissioners had made the provision—one station being at 25, Waterloo Place, and the other at the Leith works, but that the Corporation had never taken advantage of them. This brought the remark from Bailie Steel that it was information to him that they had such powers, which shows that he had not studied the Act of Parliament which he administers. A suggestion by Bailie Turnbull was adopted, that the Engineers should every month report on the average quality of the gas they manufacture. Then Mr. Macnaughton, one of the new members, displayed his lack of intimacy with gas manufacture by the question whether an inferior class of coal was not being used. To this no direct reply was given; but Mr. Linton stated that he was making gas of 2-candle power higher than he did for the Company; and the public were left to infer that that result could not be obtained with the use of inferior coal. The subject dropped without anything being done, or suggested to be done; but the talk over it which the Commissioners had may serve to allay the stupid notion that they have any desire in any way to take advantage of the community. Of other business transacted, it is satisfactory to see that Mr. Colston, who is a most capable man for the post, has been re-elected Convener of the Works Committee.

Mr. Joseph Lindsay has been re-elected Convener of the Works Committee of the Dundee Gas Commission. Mr. Lindsay is a strong supporter of the proposed electric lighting scheme for Dundee; and it was considered specially desirable that he should be continued as Convener of the Works Committee while that subject is under consideration.

The plant of the Couper Angus Gas Company is not in the best condition; and in order to reduce leakage from the mains, it has been the habit to cut off the gas supply during the day. That is to be put a stop to; the owners of gas-engines and stoves having complained of the inconvenience to which they are put by the restriction of the supply.

The Corporation of Aberdeen begins to find difficulties in the way of introducing the electric light. At a meeting yesterday of the Gas Committee, a communication was read from the Board of Trade intimating that powers would not be given to the Corporation for introducing electric lighting except in their capacity as Police Commissioners. A deputation recently appointed to visit various towns in England to ascertain the working of the two systems of electric lighting, gave in their report. It was stated that in Brighton the Company having the electric lighting of that town paid a dividend of 5 per cent., while in Liverpool 3 per cent. was paid. The general price charged was 7d. to 8d. per unit. The Corporation of Bradford work the system themselves, and charge consumers 5d. per unit. In some of the other places there was a stipulation that no one was provided with a light unless he guaranteed a consumption of the value of £14 a year. A comparison was made between electric light and gas of 16-candle power, burning for one thousand hours, and it was ascertained that, while by the electric system the cost would be 40s. 9d. (including the price of the lamp), by gas the price would only amount to 10s. 1d. The whole of the engineers consulted admitted that if gas of 30-candle power could be produced at 3s. 6d. in Aberdeen, it was equal to electric lighting of the same power at 5s. 6d. The average cost of each electric-lighting meter was found to be about £6, for which customers are charged from 5s. to 7s. per quarter. The deputation have therefore come to the conclusion that to introduce electric lighting into Aberdeen would be a very costly matter. Their report comes before the Town Council on Monday.

Last Sunday morning, during a gale of by no means exceptional violence, one of three gasholders at Peterhead was wrecked by the wind. The holder which collapsed was 15 years old; and it was not a large one—being only 25,000 cubic feet capacity—and was guided in the usual way by three upright columns. The occurrence was not seen; but it is supposed that one of the columns snapped, letting the holder down on one side; and that the other two columns gave way under the strain. In its collapse, the holder was partly overturned, and the gas it contained—it was nearly full—was entirely lost. In falling, one of the broken columns damaged the adjoining holder; but it was easily repaired temporarily. Another falling column damaged the roof of a storehouse. The accident makes it difficult for the Manager at the works to keep up the supply. A

representative from the makers of the holder visited Peterhead on Monday; and according to him it will be about a month before the damaged holder can be replaced.

In the matter of the electric light, in my district the notices given are: In Edinburgh, one by the Scottish House-to-House Electricity Company, and another by the Scottish Electric Supply Company, both for Provisional Orders; in Dundee, by the Corporation and the Gas Commissioners for an Act, and by the Scottish House-to-House, and the Brush Companies, for Provisional Orders; and in Aberdeen, by the Corporation for an Act. This is a fair budget; and it remains to be seen how it will stand the winnowing it will be subjected to at Westminster.

Yesterday afternoon 50 shares in the Stirling Gaslight Company were sold by auction in the Golden Lion Hotel, Stirling, for £8 1s. per share.

(FROM OUR GLASGOW CORRESPONDENT.)

GLASGOW, *Saturday*.

Since the reconstitution of the Glasgow Corporation Gas Committee (consequent upon the changes brought about in the *personnel* of the Town Council at the recent municipal elections), there has been shown a considerable amount of anxiety amongst the members of the Sub-Committee on Contracts regarding the delay on the part of a number of the coal contractors to "come up to time" in the delivery of the stipulated quantities of coal per month. There has certainly been great delay; so great indeed, as to have fully warranted the Gas Committee in ordering that very strong letters be written to the delinquents.

It is stated that the Special Sub-Committee of the Glasgow Corporation Gas Committee, in whose hands the electric lighting question has been placed, have resolved to come under no binding engagement with Messrs. Muir, Mavor, and Coulson, Limited, in respect of their proposals as to taking over their central station and plant, or as to transferring to them the power to light such portion of the city as may be arranged for under the Provisional Order to be obtained by the Local Authority under the Electric Lighting Acts, 1882 and 1888. The probability therefore is that Messrs. Muir, Mavor, and Coulson will proceed with their application for independent powers from the Board of Trade.

The question of electric lighting has again been under consideration by the Glasgow Gas Committee this week, by way of preparing some definite scheme to submit to the Town Council at the next meeting of that body. A well-defined district of the city has been marked off or suggested as the area within which the Local Authority shall be bound to provide electric light to all applicants who may wish to have it supplied to them. There is, I am told, a notion that powers should be asked to raise capital to the extent of £300,000 for carrying out the electric lighting scheme.

On Wednesday of this week, there had been received, in the shape of gas-rentals, for the financial year commencing on 1st of June, the sum of £19,721 13s. 1d., as against £20,111 11s. for the corresponding period of last year. These figures show a decrease amounting to £389 17s. 11d. This fact seems rather ominous, when viewed in conjunction with the increased cost of coals, and the great addition to the labour account consequent upon the recent tactics of the gas stokers. Of course, there may yet be a "turning of the tables," and the balance may very shortly be found on the other side; but it would not surprise me much to find the price of the gas slightly increased before the current financial year has come to a close.

Bo'ness was the scene of a disastrous gas explosion yesterday morning, the place being the dwelling-house of the foreman of the Forth Chemical Works, almost contiguous to the works. It would appear that the Manager of the Gas-Works (Mr. King) late on Thursday had occasion, in his usual rounds, to visit the meter in the house in question. The indication was that there was an alarming escape of gas somewhere near. The soil in the neighbourhood is made up of loose shingle, and, consequently, it was very difficult to follow the course of the escape on the road outside. As soon as light would permit, the Gas Manager and two men visited the scene, and commenced a thorough examination. When so engaged, a violent explosion occurred in the interior of the dwelling, loud enough to arouse all the people in the neighbourhood. The inmates—four in number—were at first thought to have been killed; but soon they were seen swinging down the displaced and shattered staircase. The house in the interior, especially the ground floor, was a complete wreck. The furniture had been entirely destroyed, and although the walls and top floor stand, they are badly rent in many places. The laboratory adjoining has fared still worse, as the walls thereof have been blown down, and the woodwork of the roof reduced to matchwood. The cause of the explosion is attributed to the kitchen fire igniting the gas, which must have accumulated greatly about the foundation. The inmates emerged from the wreck without even a scratch. It seems that Mr. King had been on the search for an escape of gas somewhere in the town, as there had been indications of something having gone wrong by the rapid disappearance of gas from the holder at the gas-works; but notwithstanding the great waste that took place, he was fortunately enabled to keep up the supply last night as usual.

The Glasgow market report regarding sulphate of ammonia last Monday was that the commodity was scarce, and that prices kept firm at £12 2s. 6d. per ton; at the end of the week, however, the market is somewhat less firm, buyers to-day declining to pay more than £12 per ton.

There has been another very excited week in the Glasgow pig-iron market, with a very large amount of business done both in Glasgow and hematite warrant iron. Prices have receded; that of Scotch iron ranging from 64s. to 58s. 9d. per ton, and the closing price yesterday being 60s. 9d. per ton cash. The range in the price of hematite warrants was from 75s. 6d. to 70s. per ton, while the closing quotation yesterday at noon was 72s. 6d. per ton. The position of the market this week has more closely resembled gambling pure and simple than has been the case for a very long time. It would seem as if the course of prices were being regulated, not by the position of trade, but simply by the duel going on between the "bears" and the Cleveland iron syndicate. What may be the result of the duel it is very difficult to say; but there is certainly a good general trade doing, and high prices are being paid for makers' special brands, in some cases up to 86s. per ton.

There is just a little quickening in the demand for house coal; but generally the coal trade is rather quieter than it was. In some instances prices are easier this week.

THE LIQUIDATION OF THE NOTTINGHAM AND DERBY WATER GAS COMPANY.—An extraordinary general meeting of the Nottingham and Derby Water Gas Company was held last Saturday, when the resolutions passed at the meeting on the 14th ult. (*ante*, p. 976) for the voluntary winding up of the undertaking and the appointment of liquidators were confirmed; the following gentlemen being selected:—Mr. E. Goldschmidt, Mr. C. J. Cox, Mr. J. T. M'Craith, and Mr. A. L. Wilson. A resolution was also passed expressing confidence in the two first-named gentlemen in their management of the affairs of the Company.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Nov.* 30.

Sulphate of Ammonia.—The market was strong at the beginning of the week, and continues firm, notwithstanding the endeavours of London dealers to impart weakness to the position. The position of this commodity has rarely been more satisfactory; and, in saying this, the nitrate question is entirely ignored. The reason has been previously explained; and while the present demand continues, stocks cannot accumulate, and the hand-to-mouth buying of foreign consumers is more likely to maintain the strength of the market than not. There can be no doubt that the demand this autumn and until now, from the various consuming channels of the different Ammonia products have been much larger than in previous years, and the increase of production hardly seems to balance it. The *ruses* of speculators must therefore in the end prove fruitless, and as meanwhile full prices are being paid for every parcel which comes on the market, makers need not concern themselves much about these movements. Nothing is to be bought to-day from first hands under £12 5s. Hull, and £12 2s. 6d. to £12 3s. 9d. Liverpool and Leith. As regards nitrate, the market is now firm at 8s. 9d. per cwt. on the spot, and at 9s. for November cargoes; and this notwithstanding the heavy November shipments—viz., 120,000 tons. There is to-day an excess in the visible supply of about 160,000 tons over last year—*i.e.*, about 100,000 tons more in stock, in Europe, and about 60,000 tons excess in the quantity afloat. Respecting the restriction in the output referred to last week, the following is the memorandum of agreement and the list of names of the nitrate companies, who have agreed to and signed the resolution:—"(1) That the Maquinas shall be stopped from the 1st to the 31st of December next inclusive. (2) That the production of nitrate by our respective companies in the month of January next following shall not exceed the production of November of the present year. (3) This agreement shall not be binding unless unanimously adopted and signed by all the companies represented at this meeting. (The whole of the companies registered in England were represented at the meeting, and were unanimous.) (4) That as soon as signed, a certified copy shall be handed by the Secretary to each subscriber, who shall then cable instructions out to the respective agents on the coast, and stop Maquinas after 30th of November. (Signed) The Primitiva, Colorado, San Donato, London, Rosario, San Pablo, Tarapaca, Paccha, and Jay Pampa, Julia, Taltal, San Sebastian, San Jorge, Santa Elena, Santa Rita, Liverpool, Anglo-Chilian, Santa Luisa, Lautaro, and Tamarugal Nitrate Companies."

THE PROPOSED INCREASE IN THE PRICE OF GAS AND ABOLITION OF METER-RENTS AT LEEDS.—At the meeting of the Leeds Town Council to-morrow, Alderman Gilston will move that the price of gas to consumers within the borough be increased from 1s. 10d. to 2s. 2d. per 1000 cubic feet, and to consumers outside the borough to 2s. 10d. per 1000 feet, from Jan. 1 next. Mr. Carter will also propose a resolution to the effect that from the same date meter-rents be abolished in the borough.

UCKFIELD WATER SUPPLY.—The water-works which are being constructed for the supply of Uckfield are now practically finished, and their powers were tested last Wednesday by a drill of the local fire brigade. The pressure was quite sufficient to demonstrate the usefulness of the works in case of fire; and now, for the first time in its history, all parts of the town may be reached with a copious supply of water. The event was celebrated by a dinner in the evening at the Bridge Hotel.

FATAL RESULT OF THE VAUXHALL GAS EXPLOSION.—In the JOURNAL last week we reported the occurrence of a serious explosion of gas at a drill-hall in Upper Kennington Lane, by which four persons were injured. Three of them were treated at St. Thomas's Hospital, and recovered from the effects. The other, however, was advised to become an in-patient; but he declined—preferring to be treated at the Westminster Hospital. He was admitted there on Monday night last week, suffering from superficial burns on the face, neck, hands, and arms. About an hour after he had been in the hospital, the house surgeon was sent for, and found that he had become delirious. He remained in this condition all night; and, after being very violent, died at twelve o'clock on the following day. A *post-mortem* examination revealed the immediate cause of death to be congestion of the lungs, the result of the burns. The jury returned a verdict of "Accidental death."

THE NORTHERN COAL TRADE.—There has been a falling off in the inquiry for steam coal during the past few days; but it is scarcely likely that it will endure, though the demand for coal for export must now fall off. The price of best Northumbrian steam coal is about 10s. 6d. per ton free on board; but some of the collieries ask more for next year's contracts. Gas coals are scarce; and where no contract exists, higher prices are asked. One gas company, which has this year's coal secured at about 6s. 3d. per ton, has had to pay more than 11s. per ton for a quantity needed in addition—a fact which shows how the price has risen. Production is now rather fuller; and as the holiday season draws near, it may be expected that the miners will work better. But for a month yet the demand for gas coals will be at its fullest. For coke, the demand is very large. Ordinary blast-furnace coke commands about 23s. per ton at the ovens, or nearly double the price of a year ago; while gas coke on contract is being sold at prices which have advanced more than as rapidly as has the price of coal to the gas companies. It is probable that about 13s. per ton will be the figure for gas coke for next year.

PROPOSED EXTENSION OF THE BRIGHOUSE GAS-WORKS.—Last Wednesday Mr. Arnold Taylor, one of the Inspectors of the Local Government Board, held an inquiry into an application of the Brighouse Local Board to have their Provisional Order of 1884 amended so as to increase the borrowing powers of the Board. Mr. W. J. Chambers appeared for the Local Board, which was also represented by Mr. J. Parkinson, the Gas Manager. There was no opposition. Mr. Chambers stated that the borrowing powers for £15,000 secured by the Board in 1884 had been exhausted in the improvement and the enlargement of the gas-works. The consumption of gas had increased very greatly, so that further extensions of the works were required. The Board proposed to erect a new telescopic gasholder and a new retort-house, and carry out other improvements, at a cost of close upon £20,000. In 1872 the consumption of gas was 24,700,000 cubic feet; in 1882, 44,900,000 cubic feet; and in 1888, 63,900,000 cubic feet. Gas was sold in the district at 2s. per 1000 cubic feet net; and last year, when all charges had been met, there was a balance of profit on gas-works account of about £900. The rateable value of the district now stood at £31,426. There was a present debt on the gas-works of £1,607 18s. 7d.; and the works as a going concern were well worth £50,000. The Gas Manager supplemented Mr. Chambers's statement by numerous statistics. Mr. Taylor advised the Board to ask for power to borrow £30,000 instead of £20,000, so that they would not have to trouble the Board again for some time. It was stated that the Local Board would consider the suggestion; and at a meeting held last Friday they passed a resolution in accordance with it.

THE PRICE OF GAS AT HULL.—A public meeting was held on Monday last week, to protest against the price charged for gas in the portion of Hull locally known as the Old Town; and a resolution was proposed asking the Kingston Gas Company to reduce it by 6d. per 1000 cubic feet—a deputation to wait upon the Company in regard to the matter. An amendment was submitted substituting 1s. for 6d.; and eventually this was adopted.

THE LEEDS CORPORATION AND THE BRADFORD WATER-WORKS EXTENSION SCHEME.—At a meeting of the Leeds Corporation Water Committee last Friday, the Borough Engineer (Mr. T. Hewson) reported at some length on the proposal of the Bradford Corporation to obtain an additional water supply from the Nidd Valley. He stated that it did not appear to him that the water-shed or water-works of the Leeds Corporation would be affected. Apart, therefore, from the friendly arrangement which the Corporation has entered into with Bradford, by which they are not to oppose the latter acquiring the Nidd waters, it does not at present appear that the Leeds Corporation need give even a formal opposition for protecting clauses. It would appear to be improbable, therefore, that there will be any opposition to the scheme so far as Leeds is concerned.

THE CANTERBURY GAS AND WATER COMPANY'S BILL.—The members of the General Purposes Committee of the Canterbury Corporation, at their meeting last Wednesday, had before them the notice of the Canterbury Gas and Water Company of their intention to apply to Parliament for further powers. Mr. Dean proposed that, as soon as the Bill was issued, copies thereof should be procured for the members, and a meeting called to consider it. He thought the time was opportune for them to endeavour to acquire the gas and water works. Mr. Harris considered the Bill a very important matter, and thought it would be advisable for a Committee to go thoroughly into the present position of the Company, as it affected the city and the Council. Mr. Dean's proposition was agreed to, and a Committee was appointed in accordance with Mr. Harris's suggestion.

THE VYRNWY WORKS OF THE LIVERPOOL CORPORATION.—The return of the expenditure of the Liverpool Corporation Water Committee for the three months ending Sept. 30 last embraces the following items:—Llanwyddyn embankment and reservoir works, £7001; Llanwyddyn quarry, £5203; aqueduct, £20,482; land and easements, £407; maintenance of Vyrnwy estate, £2111; and Vyrnwy Hotel £943—making a total of £36,150. The total expenditure up to June 30, 1889, amounted to £1,929,453, which, by means of deductions for rents, doctor, and transfers, amounting to £1417, is reduced to a net total of £1,964,186. Alderman Bower had the pleasure of stating, at the meeting of the Water Committee yesterday week, that Lake Vyrnwy was now absolutely full and overflowing, and everything was looking as satisfactory as possible. The discharge valves of the great masonry dam, it may be remembered, were closed on Nov. 28 last year, except for the passage daily of ten million gallons of compensation water. The water was then allowed to rise; so that it has taken just twelve months to fill the lake, 4 miles long and three-quarters of a mile wide. The contents are 13,125 million gallons; and the surface area is 1121 acres.

THE WATER SUPPLY OF SOUTH-WEST DURHAM.—An important scheme for supplying the colliery district of South-West Durham was discussed last Wednesday by the Teesdale Sanitary Board. One of the Medical Officers reported the existence of pneumonia and typhoid fever at Cockfield; and a deputation entered the room and complained of the totally inadequate supply of water in the entire district, including a large number of colliery villages. Typhoid fever has prevailed; and this had been attributed by the resident medical practitioners to the impurity of the water. All purely local supplies had utterly failed; and the inhabitants of a very wide area were in earnest as to procuring a continuous supply of good water for domestic purposes. It was contended the Waskerley Water Company were in a position to meet the demand; and it was further pointed out that their mains extended at the nearest point in this direction to Etherley. There was a disposition on the part of the entire population to join in the expense; and the Clerk was instructed forthwith to communicate with the Bishop Auckland Rural Sanitary Authority, with a view of securing co-operation in the movement. With this assurance the deputation withdrew.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For STOCK MARKET INTELLIGENCE, see *ante*, p. 1053.)

Issue.	Share	When ex-Dividend.	Dividend or Div. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.				£ s. d.
590,000	10	16 Oct.	10½	Alliance & Dublin 10 p. c.	10	17—18	..	5 16 8
100,000	10	„	7½	Do. 7 p. c.	10	12½—13½	..	5 11 1
800,000	100	1 July	5	Australian (Sydney) 5% Deb.	100	110—112	..	4 9 9
100,000	20	28 Nov.	8	Bahia, Limited	20	19—21*	..	7 12 4
200,000	5	14 Nov.	7½	Bombay, Limited	5	6¾—7	−¼	5 7 1
40,000	5	„	7½	Do. New	4	4¾—5¼	..	5 17 10
880,000	Stck.	14 Aug.	12½	Brentford Consolidated	100	217—222	−3	5 10 4
125,000	„	„	9½	Do. New	100	160—165	−2	5 12 2
220,000	20	12 Sept.	11	Brighton & Hove, Original	20	41—43	−1	5 2 4
320,000	20	27 Sept.	11½	British	20	43—45	−1	5 0 0
50,000	10	12 Sept.	11	Bromley, Ordinary 10 p. c.	10	19—21	..	5 4 9
29,000	10	„	8	Do. † p. c.	10	13—15	..	5 6 8
338,750	10	14 Nov.	10	Buenos Ayres (New) Limited	10	13—14	..	7 2 10
200,000	100	1 July	6	Do. 6 p. c. Deb.	100	107—110	..	5 9 1
150,000	20	14 Aug.	8	Cagliari, Limited	20	25—27	..	5 18 4
550,000	Stck.	16 Oct.	13⅜	Commercial, Old Stock	100	238—243	−2	5 13 2
130,000	„	„	10½	Do. New do.	100	195—200	−5	5 7 6
180,000	„	28 June	4½	Do. 4½ p. c. Deb. do.	100	119—124	..	3 12 7
557,320	20	14 June	13	Continental Union, Limited	20	48—49	..	5 6 2
242,680	20	„	13	Do. New '69 & '72	14	33—35	..	5 4 0
200,000	20	„	10	Do. 7 p. c. Pref.	20	37—39	..	5 2 6
75,000	Stck.	27 Sept.	10	Crystal Palace District	100	300—305	..	4 17 7
234,065	10	26 July	13	European, Limited	10	22—24	..	5 8 4
120,000	10	„	13	Do. New	7½	17—18	..	5 8 4
354,060	10	„	13	Do. do.	5	11—12	..	5 8 4
5,470,040	Stck.	14 Aug.	18⅔	Gaslight & Coke, A, Ordinary	100	243—247	+3	5 11 4
100,000	„	„	4	Do. B, 4 p. c. max.	100	100—105	..	3 16 3
665,000	„	„	10	Do. C, D, & E, 10 p.c. Pf.	100	250—255	..	3 18 5
80,000	„	„	5	Do. F, 5 p. c. Prf.	100	123—128	..	3 18 1
60,000	„	„	7½	Do. G, 7½ p. c. do.	100	182—187	..	4 0 4
1,800,000	„	„	7	Do. H, 7 p. c. max.	100	157—162	..	4 6 5
463,000	„	„	10	Do. J, 10 p. c. Prf.	100	248—253	..	3 19 0
1,061,150	„	14 June	4	Do. 4 p. c. Deb. Stk.	100	114—119	−2	3 7 3
294,850	„	„	4½	Do. 4½ p. c. do.	100	121—126	−2	3 11 5
650,000	„	„	6	Do. 6 p. c. do.	100	160—170	..	3 10 7
3,800,000	Stck.	14 Nov.	12	Imperial Continental	100	208—212	+2½	5 13 2
75,000	5	14 June	6	Malta & Mediterranean, Ltd	5	5—5½	..	5 9 1
560,000	100	1 Oct.	5	Met. of Melbourne, 5 p.c. Deb.	100	113—115	..	4 6 11
541,930	20	28 Nov.	6	Monte Video, Limited	20	19—20*	..	5 0 0
150,000	5	28 Nov.	10	Oriental, Limited	5	8¼—9*	..	5 11 1
60,000	5	27 Sept.	7	Ottoman, Limited	5	5¼—6¼	..	5 12 0
166,870	10	26 July	4	Pará, Limited	10	4—5	..	8 0 0
420,000	100	2 Nov.	6	People's Gas of Chicago—1st Mtg. Bds.	100	100—105	..	5 14 3
500,000	100	1 June	6	2nd Do.	100	98—102	..	5 17 8
100,000	10	16 Oct.	10	San Paulo, Limited	10	14—16	−1½	6 5 0
500,000	Stck.	29 Aug.	16½	South Metropolitan, A Stock	100	295—305	..	5 6 6
1,350,000	„	„	12½	Do. B do.	100	220—225	..	5 7 9
141,500	„	„	13½	Do. C do.	100	240—250	..	5 6 0
600,000	„	28 June	5	Do. 5 p. c. Deb. Stk.	100	138—142	..	3 10 5
60,000	5	12 Sept.	11½	Tottenham & Edm'ntn, Orig.	5	11—13	..	4 8 5
						*Ex div.		
				WATER COMPANIES.				
717,467	Stck.	14 June	9½	Chelsea, Ordinary	100	265—270	−1	3 10 4
1,720,560	Stck.	16 Oct.	7½	East London, Ordinary	100	213—217	..	3 9 1
544,440	„	28 June	4½	Do. 4½ p. c. Deb. Stk.	100	143—146	..	3 1 7
700,000	50	14 June	9	Grand Junction.	50	128—132	..	3 8 2
708,000	Stck.	29 Aug.	10½	Kent	100	276—281	..	3 14 9
1,048,800	100	28 June	9½†	Lambeth, 10 p. c. max.	100	257—262	..	3 12 6
406,200	100	„	7½	Do. 7½ p. c. max.	100	200—205	..	3 13 2
200,000	Stck.	27 Sept.	4	Do. 4 p. c. Deb. Stk.	100	119—122	..	3 5 7
500,000	100	14 Aug.	12½	New River, New Shares	100	363—368	..	3 5 10
1,000,000	Stck.	26 July	4	Do. 4 p. c. Deb. Stk.	100	127—130	..	3 1 6
902,300	Stck.	28 June	6	S'thwk & V'xhall, 10 p.c. max.	100	170—175	..	3 8 6
1,126,500	100	„	6	Do. 7½ p. c. do.	100	168—173	..	3 9 4
155,056	Stck.	14 June	10	West Middlesex	100	265—270	..	3 14 1

† Next dividend will be at this rate.

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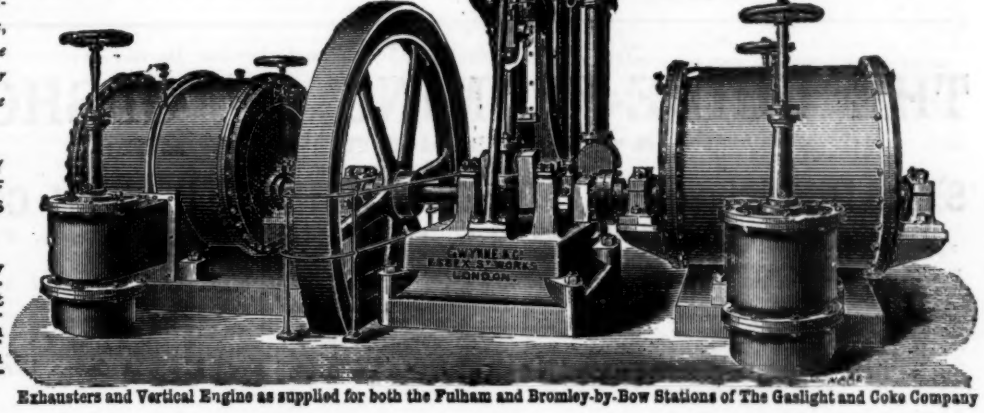

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Gas Engineers and Contractors, Makers of Wet and Dry Gas-Meters and General Gas Apparatus, Sulphate of Ammonia Plant, Lead Saturators, Tanks, &c., Tools and Sundries.

WANTED, by a competent Man, the charge of a small Gas-Works. Thoroughly efficient in all Branches.
Apply to C. HEATH, 39, Vicarage Road, NEASDEN, N.W.

TO FOREIGN GAS COMPANIES.

WANTED, by a practical Gas Manager,
of both London and Country experience, a Situation as MANAGER of Works. First-class References. Age 35. Married; no family.
Address No. 1768, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

CLERK of Works wanted, experienced in Well Sinking, to superintend the completion of an Artesian Well.
Apply, in own writing, stating age, experience, and salary required, to Lieut.-Colonel HAYWOOD, Engineer's Office, GUILDHALL, E.C.

WANTED, by the Chepstow Gas Com-pany, a young MAN who has had a little practical experience in GAS-FITTING and MAIN and SERVICE LAYING. He would have to make himself generally useful on the Works. It is a good opportunity for a young Man to learn the Manufacture and Distribution of Gas in all its Branches.
For further particulars, apply to E. J. BARNFIELD, Manager.

TIMMIS & CO., of STOURBRIDGE
Make only the best quality of FIRE-CLAY RETORTS, BRICKS, TILES, & LUMPS. Also SPECIAL SILICA BRICKS, to stand great heats.
All descriptions kept in Stock.
For Prices apply to JAMES LAWRIE AND CO, 1, Whittington Avenue, Leadenhall Street, E.C., Sole Agents for London and District.
Telegraphic Address: "EIRWAL, LONDON."

W. C. HOLMES & Co., Huddersfield,
AND 80, CANNON STREET, LONDON,
Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Settings.
*** See Advertisement p. 1039 of last week's issue.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1889, for Wet and Dry Gas-Meters, Station Meters, and Governors, Pressure-Gauges, Street Lamps, and Pillars, &c.
Telegraphic Address: "Braddock, Oldham."

SULPHURIC ACID.

HUGH WALLACE & CO., Chemical Manufacturers (the old-established firm), supply the above, which is specially adapted for making White Sulphate of Ammonia. The latter purchased in any quantities at highest market prices, or contracts for the year.
For price and terms apply Botolph House, Eastcheap, LONDON, E.C.

WANTED, a Gas-Fitter, about 25, to proceed to Ceará in December. He must be expert in Compo. and Iron Pipe Work, as well as in the general Iron Fittings of the Retort-House, &c. Engagement for three years.
Wages: £14 per month the first year; £15 per month the second year; and £16 per month the third year.
Apply, by letter only, with copies of testimonials, stating age, if married or single, and present employment, to the CEARA GAS COMPANY, LIMITED, 9, Queen Street Place, Cannon Street, LONDON, E.C.

WANTED, to purchase Gas Carbon, delivered at nearest Station to Gas-Works, in quantities of not less than 4 tons.
Address, stating price per ton and quantity, No. 1766, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a second-hand Tank, to hold about 25 tons of Tar.
Address GAS-WORKS, RUGELEY.

WANTED, second-hand, for Village, a GASHOLDER (about 30 feet diameter), small CONDENSER, PURIFIERS, STATION METER, SCRUBBER, &c. Must be in good condition.
Send price and all particulars to Mr. C. PAYNE, Redwell Street, NORWICH.

IRISH BOG ORE OXIDE OF IRON.

GAS PURIFICATION.

BALE, BAKER, & CO., direct Importers from Ireland. Sample and Price on application. Spent Oxide and Sulphate of Ammonia purchased.
120 and 121, NEWGATE STREET, LONDON, E.C.

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JOHN NICHOLSON & SONS, Chemical Works, LEEDS, specially produce this ACID for making SULPHATE OF AMMONIA of high quality and colour. *Delivery in Railway Tank-Wagons or Carboys.*
Highest References and all particulars supplied on application.

BREEZE FURNACES FOR STEAM RAISING AND RETORT FIRING.

MELDRUM BROS. are prepared to fit up their APPARATUS *on approval* to Lancashire, Cornish, and Egg-ended Boilers.
See advertisement on title page last week.
26, Half Street, Cathedral Yard, MANCHESTER.

SULPHATE of Ammonia Lead Work and Fittings. Lead Burner. Tanks and Saturators made and repaired on the shortest notice.
Address P. J. DAVIES, 78, Earl's Court Road, Kensington, LONDON.

GAS PLANT FOR SALE.

A GAS PLANT, in capital working con-dition, capable of manufacturing about 80,000 cubic feet of Gas per day, to be SOLD cheap. May be seen at Lower Houses, near Burnley.
To treat, apply to Mr. JNO. P. LEATHER, Gas Manager, BURNLEY.

TO GAS-WORKS LESSEES, ETC.

TO BE LET, for Three years or more, the NANTLLE VALE GAS-WORKS, vacant through the death of the Lessee. One man may do the whole work.
Tenders to be sent before Dec. 6.
Further particulars from the Secretary, EDWARD JONES, Bryntêg, TALYSARN, N.W.

FOR SALE—Single Gasholder, 60 feet diameter by 28 feet deep. Capacity, 65,000 cubic feet; fixed complete; in good condition.
Also one Single GASHOLDER, 80 feet by 20 feet deep, ten Cast-Iron Columns and Wrought-Iron Girders.
Also four PURIFIERS in a group, 16 ft. by 12 ft. by 3 ft. 9 in. deep; 12-inch Centre-Valve and Connections.
Would erect the above, and make practically equal to new.
Inquiries invited for various second-hand Gas Plant—Gasholders, Tanks, Purifiers, Washers, Exhausters, Station Meters, &c.
Apply to SAML. WHILE (late Ashmore and While), 60, Queen Victoria Street, LONDON, E.C.

NEWBIGGING'S HANDBOOK FOR GAS ENGINEERS & MANAGERS.

The Fifth Edition of this Work will be published next Week.

THE TEXT HAS BEEN LARGELY EXTENDED. THE BOOK NOW CONTAINS 193 ILLUSTRATIONS, AND HAS BEEN OTHERWISE IMPROVED.

PRICE: BOUND IN CLOTH, 15s.; MOROCCO, GILT, 18s.

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Now Ready, Price 6s., Cloth Bound, Bevelled Boards,

THE GUIDE-FRAMING OF GASHOLDERS
And OTHER PAPERS
CHIEFLY RELATING TO
STRAINS IN STRUCTURES CONNECTED WITH GAS-WORKS.
By F. SOUTHWELL CRIPPS, Assoc. M. Inst. C.E.

Reprinted from the JOURNAL OF GAS LIGHTING, *&c. Fully Revised and Corrected by the Author, with many Additions.*

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TOTTENHAM AND EDMONTON GAS COMPANY.

£885 Stock in this flourishing Undertaking, and offering Investments of the soundest character.

MR. ALFRED RICHARDS will Sell by AUCTION at the Angel Hotel, Edmonton (close to Silver Street Station, G. E. R.), on Wednesday evening, Dec. 11, 1889, at Seven o'clock punctually, in convenient Lots, £635 ORIGINAL "A" STOCK, and £250 "B" STOCK, paying Dividends of 11½ and 8½ per cent. respectively.

Particulars may be had of the AUCTIONEER, TOTTENHAM, and 8, NEW BROAD STREET, E.C.

BY ORDER OF THE EXECUTORS OF THE LATE EDMUND SACH, ESQ., AND OTHERS.

Gas and Water Shares in well-known and flourishing Undertakings, and offering sound Investments.

MR. ALFRED RICHARDS will Sell by AUCTION at the Mart, Tokenhouse Yard, E.C., on Tuesday, Dec. 10, 1889, at Two o'clock punctually, in Lots, the following:—

West Ham Gas Company, 127 Shares and	£400 Stock.
Tottenham and Edmonton Gas Company	£610 "
Waltham Abbey and Cheshunt Gas Company	38 Shares.
Lea Bridge Gas Company	95 "
Ilford Gas Company	23 "
Chelmsford Gas Company	10 "
South-West Suburban Water Company	29 "
Herne Bay Water-Works Company	£405 Stock.
Australasian Gas Association	£2500 "

Particulars may be had of the AUCTIONEER, TOTTENHAM, and 8, NEW BROAD STREET, E.C.

THE Corporation of Middlesbrough are prepared to receive TENDERS for about 180 tons of SPENT OXIDE. Samples will be sent on application to the Gas Manager (E. D. Latham, C.E.)

The Corporation do not bind themselves to accept the highest or any tender.

TENDERS FOR GAS LIQUOR.

THE Ascot and District Gas Company are prepared to receive TENDERS for the purchase of the GAS LIQUOR produced at their Works from Jan. 1 to Dec. 31, 1890.

Further particulars may be had on application.

WILLIAM G. HICKS, Manager.

Gas-Works, Bagshot Road, Sunninghill, Berks.

NEWPORT (MON.) GAS COMPANY.

TENDERS FOR TAR.

THE Directors are prepared to receive TENDERS for the purchase of surplus TAR for One year, from the 1st of January, 1890.

Quantity, about 500 to 600 tons.

Tenders, endorsed "Tender for Tar," to be sent in not later than the 18th of December.

By order of the Board,
EDWARD F. MARFLEET, Secretary.

Gas Offices, Newport, Mon.,
Nov. 29, 1889.

SOUTHWARK & VAUXHALL WATER COMPANY.

TO PIPE FOUNDERS.

THE Directors are prepared to receive TENDERS from Manufacturers willing to supply CAST-IRON WATER-MAINS and SPECIAL CASTINGS required by the Company.

Specification and form of tender may be obtained at the Office of the Engineer, on and after the 2nd of December, upon payment of 10s. 6d., and the same must be sent in not later than the 9th of December 1889, addressed to the Chairman, Southwark and Vauxhall Water Company, Southwark Bridge Road, S.E., endorsed "Tender for Pipes."

The Directors do not bind themselves to accept the lowest or any tender.

Southwark Bridge Road, S.E.,
Nov. 28, 1889.

SOUTHWARK & VAUXHALL WATER COMPANY.

TO COAL MERCHANTS.

THE Directors invite Tenders for the supply, at their several Stations, of about 20,000 tons (more or less) of COAL during the year 1890.

Specification and form of tender may be obtained at the Office of the Engineer, on and after the 2nd of December, upon payment of 10s. 6d., and the same must be sent in not later than Dec. 9, 1889, addressed to the Chairman, Southwark and Vauxhall Water Company, Southwark Bridge Road, S.E., endorsed "Tender for Coal."

The Directors do not bind themselves to accept the lowest or any tender.

Southwark Bridge Road, S.E.,
Nov. 28, 1889.

TENDERS FOR TAR.

THE Directors of the Weston-super-Mare Gas Company are prepared to receive TENDERS for the surplus TAR made at their Works during the year ending the 31st of December, 1890, or such other term as may be agreed upon.

The minimum quantity will be about 275 tons per annum.

Delivery into Contractor's Tank Wagons at the Works of the Company.

Narrow-gauge Tanks can only be received.

Tenders, endorsed "Tar," to be sent in to the Manager of the Works, not later than the 19th day of December inst.

The lowest or any other tender not necessarily accepted.

Any further particulars may be had by applying to

J. H. GRAY.

Gas-Works, Weston-super-Mare.

THE Directors of the North Bierley Gas Company are prepared to receive TENDERS for 90 tons of OXIDE OF IRON, to be delivered at Low Moor Station, Lancashire and Yorkshire Railway; the whole required to be delivered by the 20th of December, 1889.

Tenders to be addressed, not later than the 12th of December, to the Chairman, North Bierley Gas-Works, Oakenshaw, near Bradford.

For further particulars, apply to

W. OLDFIELD, Manager.

Nov. 30, 1889.

SURPLUS TAR.

THE Gas Committee of the Corporation of Coventry are prepared to receive TENDERS for the purchase of the surplus TAR produced at their Works, Coventry, for One year, from Dec. 31 next.

Make, about 1500 tons per annum.

Tenders, stating price per ton delivered into Boat, to be addressed to the Manager, and marked "Tender for Tar," not later than Saturday morning, Dec. 14.

The Committee do not bind themselves to accept the highest or any tender.

GEO. WINSTANLEY, Assoc. M. Inst. C. E., Manager, &c.

Gas-Works, Coventry, Nov. 25, 1889.

SURPLUS TAR.

THE Gas Committee of the Borough of Doncaster invite TENDERS for the surplus TAR produced at their Works in the Holmes, Doncaster, for a period of One, Two, or Three years, to commence Jan. 1, 1890.

The Tar will be delivered into Tank Barges in the River Don, alongside the Gas-Works, and in no other form.

Tender forms, and any other information, may be obtained on application to Robert Bridge, the Engineer.

Tenders (endorsed) on Committee's form, will be received on or before Wednesday, the 11th of December next, by the undersigned.

The Committee do not bind themselves to accept the highest or any tender.

By order,
H. WAINWRIGHT, Chairman.

Gas-Works, Doncaster, Nov. 28, 1889.

THE Birstall Local Board are prepared to receive TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR (the latter at 4°, 5°, and 6° by Twaddel's Hydrometer respectively) made or produced by them at their Gas-Works, Smithies Birstall, adjoining the London and North-Western Railway Station, for One, Two, or Three years, at the option of the Local Board, from the 1st day of January, 1890.

Tenders, stating price per ton for each article, and for the Liquor at each strength, sealed and endorsed, must be sent to me not later than Twelve o'clock at noon on Thursday, the 12th of December, 1889.

The successful Contractor will, at his own expense, have to enter into an agreement and bond with and to the Board for the due performance of his contract.

The Local Board do not bind themselves to accept the highest or any tender.

For further particulars, apply at the Gas-Works Offices, or to

WM. MIDDLEBROOK,
Solicitor and Clerk to the Board.

Birstall, near Leeds, Nov. 28, 1889.

CORPORATION OF LEICESTER.

AYLESTONE ROAD WORKS.

SECTION No. 2.—CONTRACT No. 24.

RETORT MOUTHPIECES.

THE Gas Committee of the above Cor- poration are prepared to receive TENDERS for the supply and delivery of 256 CAST-IRON SELF-SEALING RETORT MOUTHPIECES at their Aylestone Road Works.

Form of tender and further particulars may be obtained upon application to the Engineer, and on the payment of a sum of £5, which amount will be returned upon receipt of a *bond fide* tender.

Tenders, addressed to Councillor Lennard, Chairman, and endorsed "Tender for Mouthpieces," to be delivered at these Offices, not later than Eleven o'clock a.m., on Saturday, Dec. 7, prox.

The Committee do not bind themselves to accept the lowest or any tender.

ALFRED COLSON, M. Inst. C.E., Engineer and Manager.

Gas Offices, Millstone Lane, Leicester,
Nov. 23, 1889.

CORPORATION OF LEICESTER.

AYLESTONE ROAD WORKS.

SECTION No. 2.—CONTRACT No. 25.

STATION METER.

THE Gas Committee of tue above Cor- poration are prepared to receive TENDERS for the supply and erection of One 80,000 cubic feet per hour STATION METER at their Aylestone Road Works. Foundations will be provided by the Gas Committee.

Form of tender and further particulars may be obtained upon application to the Engineer, and on the payment of a sum of £5, which amount will be returned upon receipt of a *bond fide* tender.

Tenders, addressed to Councillor Lennard, Chairman, and endorsed "Tender for Station Meter," to be delivered at these Offices not later than Eleven o'clock a.m. on Saturday, Dec. 7, prox.

The Committee do not bind themselves to accept the lowest or any tender.

ALFRED COLSON, M. Inst. C.E., Engineer and Manager.

Gas Offices, Millstone Lane, Leicester,
Nov. 28, 1889.

THE GASLIGHT AND COKE COMPANY.

NOTICE is hereby given that the Trans- FER BOOKS of this Company, so far as they relate to the DEBENTURE STOCKS and BONDS, will be closed on the evening of Tuesday, the 10th of December next, for the Half Year ending on the 31st of December, 1889, and that the Interest for that Half Year will be payable on the 1st of January next, to the Proprietors registered as the Holders of such Debenture Stocks and Bonds at the time of such closing of the Transfer Books, which will be re-opened for the following Half Year on the morning of Wednesday, the 11th of December next.

By order,
JOHN ORWELL PHILLIPS,
Secretary and General Manager.

Chief Office: Horseferry Road,
Westminster, S.W., Nov. 30, 1889.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their Inventions may be secured for Twelve months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 23, Great George Street, WESTMINSTER.

Price 2s. per dozen, or 10s 6d. per 100, post free.

CONSPIRACY and Protection of Pro- perty Act. It is required, under a Penalty of FIVE POUNDS, that a Printed Copy of the 4th Section of this Act shall be posted up at all Gas-Works, in a conspicuous place, where the same may be conveniently read by the persons employed thereat.

Printed copies of this Section, in large type, on broad sheets, may be obtained of WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

*** *The Act extends to Scotland and Ireland.*

Price One Guinea. Fcap. folio, scarlet cloth,

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DESIGNED AND CARRIED OUT BY

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OF

Gas Values, Discounts, Dividends, and Weights and Measures,

FOR USE IN GAS OFFICES.

REPRINTED FROM THE SECOND EDITION OF

"Newbigging's Gas Manager's Handbook."

WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

Now Ready, Fcap. 4to, Cloth, Gilt Lettered, with numerous Illustrations, price 7s. 6d., post free.

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A GUIDE TO THE STUDY OF THE

MEASUREMENT OF LIGHT.

By William Joseph Dibdin, F.I.C., F.C.S.,

Member of the Society of Public Analysts and of the Committee of the London Section of the Society of Chemical Industry.

Chemist and Superintending Gas Examiner to the London County Council.

The aim of the Author has been to give a comprehensive account of the various methods of Photometry in daily use, and to make the book thoroughly practical by indicating the many precautions necessary for ensuring accurate results in photometrical work. The volume contains chapters on the History and Principles of Photometry; Horizontal, Radial, and Jet Photometers; Standards of Light; the Proposed Substitute for Candles; the Auxiliary Apparatus required in Testing Gas; the Examination and Adjustment of a Gas-Testing Photometer; and Colour and Stellar Photometry; together with an Appendix comprising the Notification of the Metropolitan Gas Referees, Tables for the Correction of Volume of Gas and Observations of Candles, and other matter useful to Photometrists.

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APPARATUS for ASCERTAINING HEATING POWER of COAL, COKE, & OTHER FUEL.

MANUFACTURED BY

JONATHAN WILKINSON, Gas Engineer,

Gas Examiner to the Sheffield and Rotherham Corporations, &c., &c.

Instructions are furnished with the Apparatus, which render the manipulation easy, and in the hands of any moderately careful person, will give MORE CORRECT results than can be obtained by any of the expensive, laborious, and intricate processes previously in use.

Apparatus, complete, in polished Mahogany Case lined with Cloth, with additional Tests for Lignite, and Sulphuretted Hydrogen Gas, Test Tubes, Box-end Beam, and and Glass Scales. } £5 10 0

IMPROVED PHOTOMETER DISCS.

J. W. solicits a trial of his Improved PHOTOMETER DISCS, which are prepared with great care, and made very sensitive to the difference in the reflected and transmitted light, enabling the operator to balance the light on both sides of the Disc with ease and accuracy.

Price of Single Disc, free by post, 1/7.
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MANUFACTURER OF **WOOD GRIDS** FOR GAS PURIFIERS,

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(Established 1820)

FIRE-BRICK AND TILE MERCHANTS,

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DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES and FIRE-CLAY, and every Article suitable for

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W. G. WALLER & Co.,

RETORT SETTERS & CONTRACTORS,

Having had much experience in the Setting of Retorts beg to call the attention of Gas Engineers and Managers to their Improved System of Setting Retorts and Tar-Furnaces.

Contractors for Building Shafts, Tanks, Retort Benches, and all other Buildings connected with Gas-Works.

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UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD

BLACK BED GAS COAL.

Prices and Analysis on application.

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MIRFIELD, NORMANTON.

GAS AND WATER PIPES.

1¼ to 12 IN. BORE.

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ALSO MANUFACTURERS OF

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FIRE-CLAY & BRICK WORKS,

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Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.

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SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

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MANUFACTURER OF SULPHURIC ACID

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WHITE SULPHATE OF AMMONIA.

TAR, LIQUOR, AND SPENT OXIDE Purchased for Cash against Delivery.

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For particulars, apply to

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GANISTER BRICKS

OF VARIOUS SIZES,

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SUPPLIED FROM

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ANTI-RED LEAD

(SCOLLICK'S PATENT).

This jointing Mastic far supersedes Red and White Lead, and is 30 per cent. cheaper. It has been, and is being supplied to The Gaslight and Coke Company's Beckton, St. Pancras, and Kensal Green Stations; and to show that it gives satisfaction, ten orders have been received from Beckton during this year. Amongst other Works it has been supplied to Vauxhall, South Shields, Sheffield, Maldstone, Walton, &c., &c.

Circulars and full particulars on application to the Sole Agents—

S. CHANDLER & SONS,

KENNINGTON OVAL.

COZE'S AUTOMATIC SYSTEM OF Charging and Drawing Retorts.

THIS System of automatically Charging and Discharging Retorts without machinery or arduous labour, which is in operation at several places, will shortly be at work in England.

All information as to the advantages, cost, &c., of the System, can be obtained from the undersigned, who will arrange to grant the user for a small Payment per Retort, or a slight Royalty. The System is fully patented; and any infringer will be strictly proceeded against.

An Agent will shortly be appointed in England.

A. COZE,

MANAGER, RHEIMS GAS COMPANY, FRANCE.

CAST-IRON PIPES

FOR GAS AND WATER.

VALVES

FOR GAS, WATER, AND STEAM.

TELEGRAMS: "PIPES GLASGOW."

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JAMES WHITE & CO.,

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Sole Proprietors of the Largest and Purest Beds of Fire-Clay in England.

FOR GAS FURNACES our GANNISTER and SILICA FIRE-BRICKS are acknowledged to be the best and most durable in the market.

GANNISTER and SILICA FIRE-CLAY guaranteed of the Purest and Finest Quality.

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Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

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BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·68 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. f.
Illuminating Power	16·3 candles.
Coke	70 per cent.

For Prices and complete Analysis, apply to

YOUNG, DANCE, & CO.

COAL OWNERS, NEWCASTLE-ON-TYNE,

Or E. FOSTER & CO. 21, John St., Adelphi, LONDON, W.C.

THE ONLY RELIABLE

DRY CENTRE-VALVE.

WORKING ONE, TWO, THREE, OR FOUR PURIFIERS ON AT THE TIME.

ALSO MADE FOR TWO OR THREE PURIFIERS.

No Springing. No Leakage. No Foul Gas passed in Changing. Special Facility for Blowing the Air out of the Fresh Box before putting in Action, without driving it forward into the Holders.

Write for Prospectus.

ALSO DOUBLE-ACTION DOUBLE-FACED GAS & WATER VALVES.

F. WECK, 86, NEW STREET, BIRMINGHAM.

JAMES OAKES & Co.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

Wenlock Iron Wharf, 21 & 22, Wharf Road,

CITY ROAD, LONDON, N.

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1¼ to 48 inches in diameter; and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts, and covers, and rendering leakage impossible.

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THOMAS TURTON AND SONS, LIMITED,

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STEEL OF ALL DESCRIPTIONS.

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POPE & PEARSON, LTD.,

have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields in practical working over 10,000 cubic feet of gas, with an illuminating power of 16 candles; or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12¼ cwt. of good coke.

This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

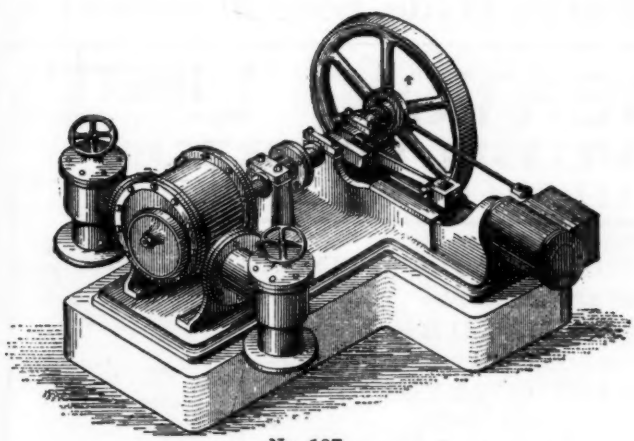
G. WALLER & Co.'s NEW PATENT GAS EXHAUSTER.

MADE WITH 4, 3, OR 2 BLADES.

In use at, or on order for, over 120 *Works, equal to* 6,840,000 *Cubic Feet per Hour.*

Oldest Makers of Beale Exhausters for over 300 Works and 25,600,000 cubic feet per hour

1,000 to 250,000 CUBIC FEET PER HOUR WITH OR WITHOUT ENGINE COMBINED.



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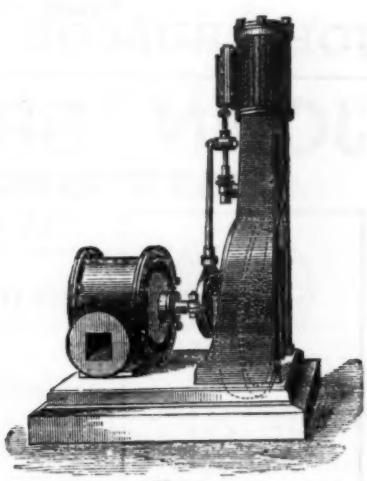

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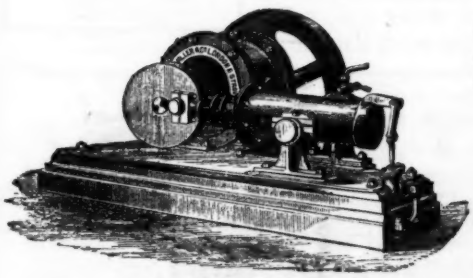

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Disc, Rack, and Screw Valves, Compensating Governors (For Steam Throttle Valves),

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CANDLE SAFETY LAMPS.
Are a great improvement on Oil, giving a good Light requiring little or no Cleaning, and when once lighted no further attention is necessary. The Candles are made to burn 5, 7, or 9 hours.

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effecting a great saving of time, labour, and expense.
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JOHN CLARKSON MAJOR,
(Established 1851,)
Tar Distiller and Manufacturing Chemist,
WOLVERHAMPTON.
BRANCH WORKS:—
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MANUFACTURERS OF WROUGHT-IRON TUBES AND FITTINGS, BRASS GAS-FITTINGS, GAS-VALVES, STEAM AND WATER VALVES, &c.,
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PATENT TWISTED TAPS, DIES, & CUTTERS.
Thousands in constant work, give universal satisfaction.
Work Easier, Less Friction, Last Longer, and do Better Work than straight Grooves.
Main Drilling Stand, with Cup Drills, 1¼ to 6 inch; Taps, Rymers, and Drills.
Ratchet Screwing Stocks, and Adjustable Once-up Stocks, Dies, Guides, &c.
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FOR GAS, STEAM, WATER, &c.
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MANUFACTURERS OF EVERY DESCRIPTION OF
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FOR ANY PURPOSE.

SPENT LIMES NO LONGER WASTE PRODUCTS!

G. R. HISLOP'S PATENT REGENERATIVE PROCESS

MOST EFFECTIVELY AND *ECONOMICALLY RESTORES* LIME WASTES CONTINUOUSLY.

The Patentee having under his several Patents effected a complete solution of the Spent Lime difficulty, most confidently solicits the consideration of the fact by the Engineers and Managers of Gas Companies, Gas Corporations, and other Spent Lime producers. The adoption of these Patents secures the following amongst other advantages, viz.:—1st. Nuisance is avoided, and the utmost convenience and comfort in Gas purification are secured. 2nd. The Lime is recovered at from one-third to one-half the cost of new Lime, or from 5s. 6d. to 7s. 6d. per Ton (depending on extent of works and working charges). 3rd. The Lime is either recovered for Building and Agricultural purposes, or specially and continuously for Gas purification—no limit being assigned to its durability. 4th. Nearly the whole of the valuable sulphur is collected and sold. 5th. By the Patentee's Improved Furnace, breeze or inferior cannel coke only is required as a fuel. The process has been worked for a considerable time by several important Gas Companies and Corporations throughout the Kingdom, and with the most satisfactory results. The Patentee erects, proves, and grants working on very moderate terms.

Further particulars may be had on application to A. F. WILSON, Esq., Assoc. M. Inst. C.E., 12, Walbrook, London, E.C., Agent for London; J. E. FISHER, Esq., Stourbridge, Agent for the rest of England, Wales, and Ireland; or to the Patentee—

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SIXTY PER CENT. ECONOMY IN GAS LIGHTING.

The Schülke Regenerative Lamp

FOR

DOMESTIC AND EXTERNAL LIGHTING.

The only Regenerative Lamp employing the Common Flat-Flame Burners.

Lamps giving 20-Candle power consume less than four feet of Gas per hour.

A PURE WHITE & PERFECTLY STEADY LIGHT,

NOT AFFECTED BY DRAUGHTS.

Suitable for any existing fittings (Brackets or Suspending).

Can be fixed in a few minutes.

May be seen at the Offices of the

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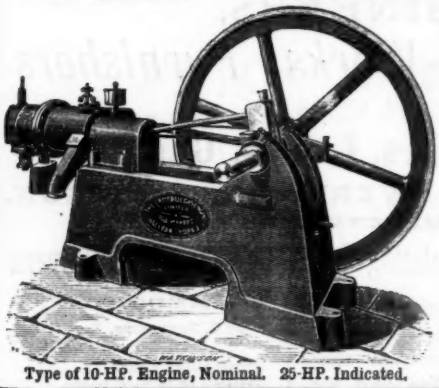
Room 446—11, QUEEN VICTORIA STREET, LONDON, E.C.,

Where Price Lists and full particulars may be obtained.

THE "CAMPBELL" GAS-ENGINE.



Type of 10-HP. Engine, Nominal. 25-HP. Indicated.

GREAT SUCCESS.

20 PER CENT. CHEAPER THAN ANY OTHER.

Gives the Highest Satisfaction with all kinds of Work.

Testimonial from Mr. JAMES MOON, Engineer to the Filey Gas-Works.

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GENTLEMEN,—We have been using one of your Gas-Engines on our Works for about four months, and I have pleasure in saying that it does its work in a very satisfactory manner. The engine is half-horse power, steady in all its movements, and, with ordinary care, will drive the exhaust apparatus at an even gauge.—I remain, Yours respectfully,

(Signed) JAMES MOON.

For Price Lists and full particulars, apply to the Sole Makers:

THE CAMPBELL GAS-ENGINE Co. LIMITED,

WELL LANE, HALIFAX, YORKS.

JOSEPH CLIFF AND SONS,

THE ORIGINAL (ESTABLISHED 1795). **WORTLEY FIRE-BRICK WORKS,**

NEAR LEEDS.

SPECIAL NOTICE.—Our Patent Machine-Made Retorts have now been thoroughly tested, and have proved themselves infinitely superior to those made by hand. At several large works it has been settled, beyond question, that, owing to the compactness and general excellence, more gas is sent to the gasholder from each ton of coal carbonized than is the case with hand-made Retorts.

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THREE MEDALS AND HONOURABLE MENTION

WERE AWARDED TO

JOSEPH CLIFF & SONS,

For their Various Exhibits, amongst which is a

SILVER MEDAL FOR THEIR PATENT MACHINE-MADE RETORTS AND FIRE-BRICKS,

Being the Highest Honour given for this Class.

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PATENTEE OF

A SPECIAL COMPOUND

FOR THE CURE OF STOPPED ASCENSION-PIPES,

A couple of charges of which will clear a stopped pipe, and an occasional charge keeps them clean, and also increases the make per ton and the illuminating power.

PRICE AND PARTICULARS ON APPLICATION.

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The undersigned, SOLE AGENTS for this celebrated Gas Cannel, now offer it for delivery at any port in

GREAT BRITAIN,

ON THE CONTINENT,

OR SOUTH AMERICA.

This Cannel ranks with the Australian Shale as an enricher of Coal Gas; One Gross Ton producing

15,000 Cubic Feet of 50-Candle Gas, & 26 Bushels of superior Marketable Coke.

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THE GAS APPARATUS Co., PETERBOROUGH,

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Manufacturers, Gas-Works Furnishers

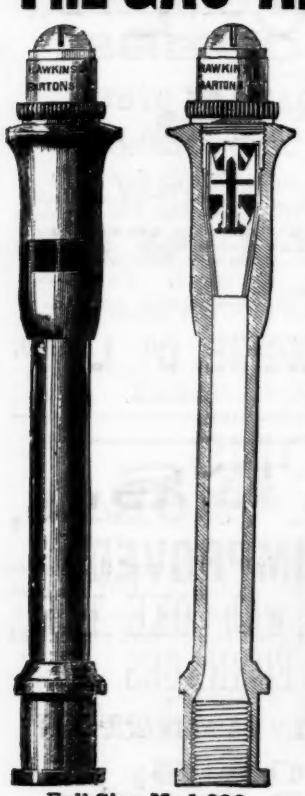
AND MAKERS OF ALL KINDS OF

Gas Burners, Governors, Lamps, Gauges,

AND SPECIALTIES OF EVERY DESCRIPTION.

ALSO SOLE MANUFACTURERS OF

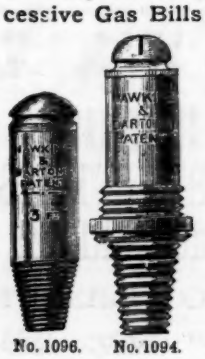
Hawkins & Barton's Patent Self-Regulating Lamp Governors and Burners.



Full Size, No.1 098.

These Governors are made to take to pieces for cleaning and re-adjusting.

An enormous quantity of these Burners are in use in this Country and abroad; and they have never failed to give satisfaction. Wherever they are adopted, complaints against Bad Gas and Excessive Gas Bills naturally cease. Owing to their extreme simplicity, they cost less than half that of any others and will last years without attention.



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Trial Orders Solicited.

PRICES AND TERMS ON APPLICATION.

REPORTS

By T. Newbiggin, Esq., C.E *Feb.* 25, 1889.

Burner tested, 4 feet.
Pressure, 10, 15, 20, 25 tenths.
Consumption, 4, 4, 3·95, 3·8 feet.

By G. Bower, Esq., C.E., St. Neots, *March* 12, 1889.

"I have tested your Pressure Regulating Burners; and I find that those you sent me do not vary more than two-tenths under pressures varying from six to forty tenths. I shall not only use them myself, but I shall recommend others to use them."

By J. Mackay, Esq., Engineer, Gas-Works, Peterhead, *July* 13, 1889.

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Awarded FIRST PRIZE MEDAL at the Falmouth Royal Polytechnic Exhibition, 1889.

WATER GAS FUEL GAS

FOR INDUSTRIAL PURPOSES

GENERATED FROM

BITUMINOUS SLACK COAL

BY THE

LOOMIS PROCESS.

The Cheapest Gas-Generating System in the World.

NOVEL IN DESIGN.
MODERN IN CONSTRUCTION.
SIMPLE IN OPERATION.
PERFECT IN RESULTS.

PROCESS AND APPARATUS PATENTED IN ALL COUNTRIES.

By this system more gas, and of a higher heating power per cubic foot, can be generated from a ton of Bituminous Slack Coal than by any other from a ton of Anthracite Coal or Coke.

The successful application of Water Gas for industrial purposes was brought about through this Process at the Works of the—

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Many other industrial establishments in America are successfully using this Process, and a large number of Works are now being erected including a plant at Brussels and at Sheffield (at Messrs. Thomas Firth and Sons, Limited).

This process is especially adapted for firing all classes of Pottery, Tile, and Brick Kilns.

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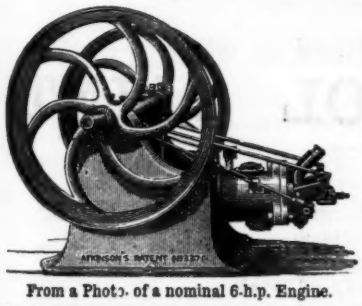

From a Photo. of a nominal 6-h.p. Engine.

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GAS-ENGINE.

The simplest and most economical Gas-Engine made.

THE BEST ENGINE FOR ELECTRIC LIGHT.

Consumes less Gas per brake horse power than any other Gas-Engine.

TELEGRAPHIC ADDRESS: "MANLOVES NOTTINGHAM."

SPECIALITIES.

THE "NUGENT" RECUPERATIVE RETORT SETTINGS and FURNACES.

"ROBUS" IMPROVED RETORT SETTINGS, with COKE, TAR, and BREEZE FURNACES.

THE ABOVE SETTINGS & FURNACES ARE PROVING EMINENTLY SATISFACTORY

Every Particular, with Estimates, forwarded upon Application to

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CONTRACTORS FOR THE ERECTION OF GAS & WATER WORKS,
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BELL'S ASBESTOS AQUOL PAINT

TRADE MARK. BELL'S ASBESTOS

IS MADE READY FOR USE.

IS FIRE RESISTING.
IS WASHABLE.
IS NON-POISONOUS.
IS MANUFACTURED IN ALL USEFUL COLOURS.
IS IMPERVIOUS TO HEAT, COLD, OR WATER.
IS WITHOUT SMELL.

No expensive Oil or Turpentine required.

WILL NEVER BLISTER.

HAS A COVERING CAPACITY 40 PER CENT. GREATER THAN LEAD PAINTS.

For Outside or Inside Work in any Climate.

Bell's Asbestos Aquol Paint is equally suitable for the finest decorative work as well as for general painting. It can be applied over or under any other paint, and, owing to its easy application, can be used with a large distemper brush; the SAVING THUS EFFECTED IN LABOUR BEING **50** PER CENT. OVER THAT OF LEAD PAINTS.

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BELL'S ASBESTOS AQUOL PAINT is specially adapted for Private Houses, Exhibition Buildings, Ships, Churches, Asylums, School Boards, Railway Stations, and all work of Wood, Iron, Cement, Plaster, Stone, Brick, &c., &c.

Those who Study Economy and Protection from Fire should use only

BELL'S ASBESTOS AQUOL PAINT.

BELL'S ASBESTOS AQUOL PRIMING is made Ready for Use.
BELL'S ASBESTOS AQUOL PRIMING stops all suction of Wood, Cement, Plaster, &c.
BELL'S ASBESTOS AQUOL PRIMING should be applied to all New Work.

Suitable for Ceilings, Walls, and New Wood, and is very durable.

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AN EXCELLENT CURE FOR DAMP WALLS.

Colour Cards and Price Lists on Application.

Supplied in Casks of 5 to 7 cwt., and Iron Drums of 28, 56, and 112 lbs., Sample Tins of 7 and 14 lbs.

Owing to its Covering Capacity, a SAVING IN FREIGHT of 40 per cent. is effected for a given surface.

BELL'S ASBESTOS COMPANY, LIMITED,

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EXPANSION SHEETING.

EXPANSION RINGS.

The above, which can only be obtained from this house, is recognized as the **most efficient and economical jointing material in use.** It is composed of a specially-prepared India-rubber Compound, protected by a covering of Vulcanized Asbestos Sheeting, as shown above; and as it is the only Jointing Material which adequately **combines permanent elasticity with heat resistance,** the advantage it possesses will at once be seen.

The centre from which the requisite elasticity is obtained will adapt itself to uneven surfaces to which it may be applied, and allow the expansion and contraction to be fully taken up. The covering being of Asbestos Cloth imparts a protection to the centre, and so prolongs its elasticity. **For Manhole, Mudhole, Steam Pipe, and Mash Tun Door Joints, it is unequalled;** and if applied as directed, **a ring can be used many times over.**

Made from 1-Ply for Cylinder and Faced Joints to any thickness for Uneven Surfaces.

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HULL: Humber Dock Basin.
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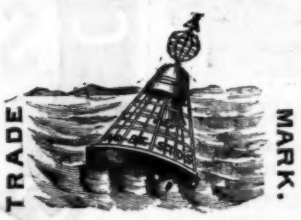

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And BARCELONA.

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Is the BEST LOCOMOTIVE PACKING made.

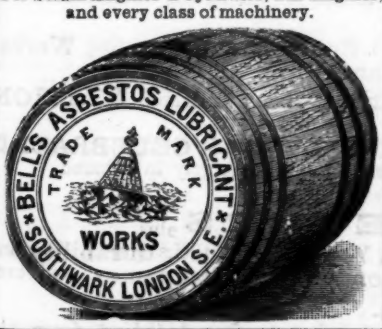
BELL'S

COMPOUND HYDRAULIC PACKING

Is specially suited for Hydraulic Machinery, Accumulators, and Ammonia and all Pumps.

BELL'S ASBESTOS LUBRICANT

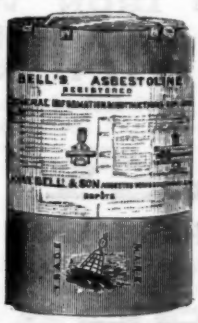
Is unequalled
For Steam-Engines & Cylinders, Gas-Engines, and every class of machinery.



BELL'S ASBESTOLINE

The reputation of this Lubricant is based on the experience of thousands of users, which places it far in advance of those who rely only on mere laboratory tests.

ASBESTOLINE IS THE CHEAPEST MOST EFFICIENT, CLEANEST MOST INODOROUS AND SAFEST LUBRICANT.



ASBESTOLINE HAS SAVED 90 PER CENT. OVER OIL.

Has been used for all purposes, AND BEATEN ALL OTHER LUBRICANTS IN ACTUAL WORK.

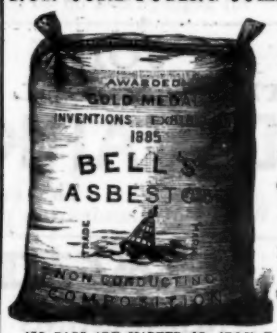
BELL'S ASBESTOS

"DAGGER" PACKING

Is unequalled for every kind of Marine and Land Engine, Steam-Pumps, &c., and has proved itself to be the most efficient durable, and economical Packing made.

BELL'S ASBESTOS

NON-CONDUCTING COMPOSITION.



Will reduce loss by radiation, and saves 40 per cent. of fuel.

Is suitable for boilers with flat or round bottoms. Is superior to any other, and saves its cost in a few months.

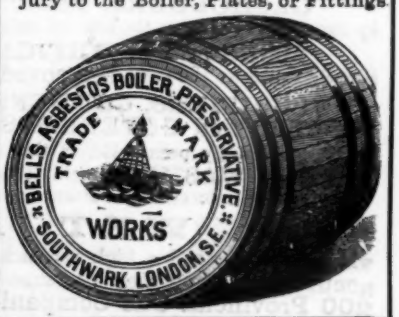
Is sent out dry in bags; therefore cheaper than others sent out wet.

ALL BAGS ARE MARKED AS ABOVE.

BELL'S ASBESTOS

BOILER PRESERVATIVE

Will effectually keep Boilers clean, and remove any Incrustation, without injury to the Boiler, Plates, or Fittings.



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SUPPLY FROM STOCK

CAST-IRON RETORTS

AND ALL KINDS OF GAS-WORKS APPARATUS.

SOCKET-PIPES FOR GAS OR WATER PURPOSES.

FLANGE PIPES FOR STEAM.

Sole Manufacturers of **LYON'S 'PATENT' GAS MAIN SYPHONS**

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Ironfounders, Gas and General Engineers,

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MANUFACTURERS OF

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To suit all sized sections of Retort. Over 70 stock sizes. Largely used in England.

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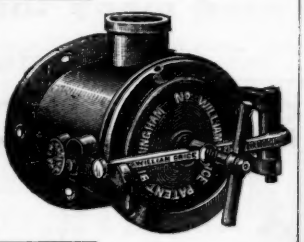

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Of all Kinds.

ENGINES, Vertical and Horizontal; High and Low Pressure
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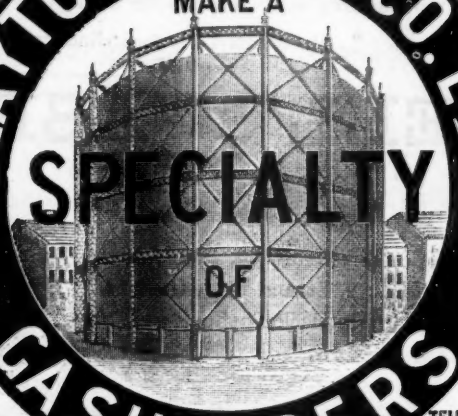

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WET AND DRY METERS,

which have acquired a high reputation for the **excellence** of Materials and Workmanship; their **durability** and **accuracy** of **Register** guaranteed. They are used by several of the **London Gas Companies,** and over **200 Provincial Gas Companies.**

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NEW HIGH-POWER GAS-LAMP,
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Gas Companies should hire these Lamps to their Consumers, and introduce them for Street Lighting as a rival to the Electric Light, as they do not get out of order, are most economical, and the Burner being a circular slit does not choke up.

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Improved High-Power Lanterns for Lighting Street Refuges and Open Spaces.

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STATION METERS, EXPERIMENTAL METERS, PHOTOMETERS, & PRESSURE-GAUGES, &c.

Results of Tests of Dry Gas-Meters (Section III.) of the Glasgow Philosophical Society's Gas Exhibition, as per London "Gas Journal," May 10, 1881.

	ALDER & MACKAY.	W. & B. COWAN.	G. GLOVER & Co.	JAMES KEITH.	D. B. PEEBLES & Co.
Total of Fast Tests . .	47·2 ...	6·9 ...	33·6 ...	62·3 ...	53·7
Total of Slow Tests . .	25·3 ...	117·4 ...	43·1 ...	31·4 ...	38·5
	72·5 ...	124·3 ...	76·7 ...	93·7 ...	92·2

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PRESSURE RAISERS

Have been supplied for many years, and are now in successful operation, for the purpose of

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The Machine acts as an Exhauster, drawing the Gas from the Main and propelling it according to the Pressure required. The result is obtained by a Wet-Meter Drum, which is revolved by Multiplying Wheels and Pullies, actuated by a Weight, as shown in the Engraving. The Pullies may be so arranged as to keep the Apparatus at Work for many hours, provided only there is sufficient depth for the Weight to fall. Pressure Raisers have been successfully employed in connection with Apparatus for the Manufacture of Oil Gas, &c. They are also used for supplying a current of Air for various purposes.

TESTIMONIALS.

From Peter W. Barlow, Esq., F.R.S., F.G.S.
Engineer to the Tower Subway Co.

56, Landsdowne Road, W.,
Feb. 21, 1888.

DEAR SIRS,

The Gas-Pressure Engine in the Tower Subway acts most satisfactorily. It requires very little attention, and is very rarely out of order.

I am, yours truly,
PETER W. BARLOW.

Cork Gas Consumers' Company,
Gas-Works, Cork,
20th Feb., 1883.

GENTLEMEN,

In reply to yours, I beg to say that the Motive-Power Meters with which you have supplied this Company are doing very well. With them we are able to give a good supply to consumers in districts where it would be otherwise difficult to do so.

I am, faithfully yours,
THOMAS TRAVERS,
Engineer.

COTTAGE LANE WORKS, CITY ROAD, LONDON, E.C.

Telegraphic Address: "INDEX, LONDON."

[See also Advt., p. 1050.

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